THE
ELECTRICAL REVIEW

Volume CXXVI. No. 3262

Friday, May 31st, 1940

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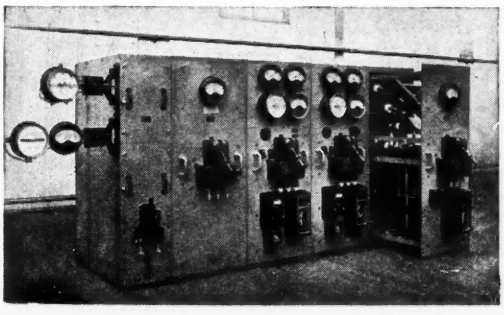

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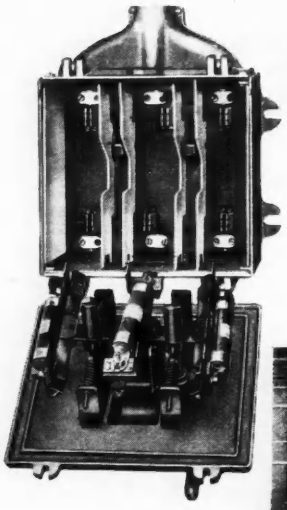

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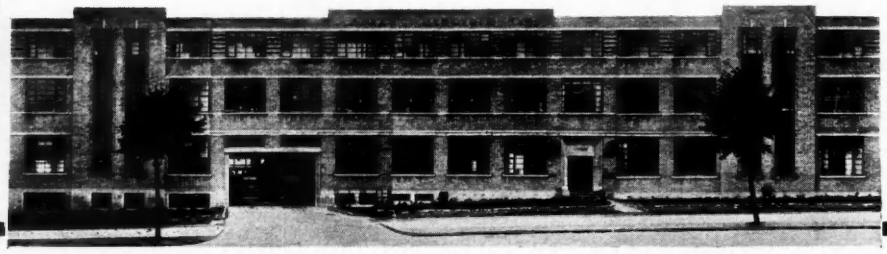

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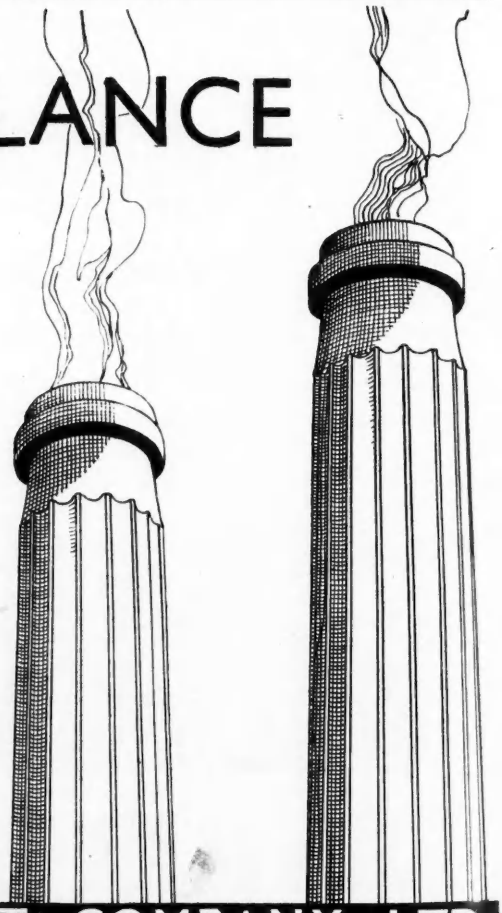

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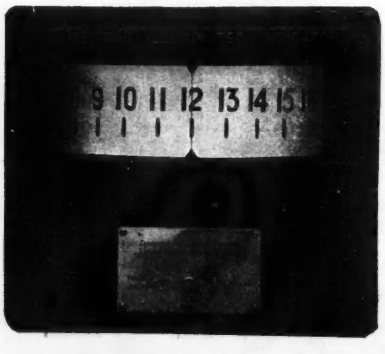

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Vol. CXXVI. No. 3262 MAY 31, 1940 Price SIXPENCE

The National Service Column

Engineers and Their Duty

NO individual interest and no legal pedantry are to be allowed to stand in the way of the adoption of every possible means of defending our country against the hideous menace that confronts us. In the forefront of the measures that are being taken to this end stands the Government's plan to co-ordinate the work of all of us, whether it be by hand or by brain. This means that everyone in a civil occupation will be required to pull his weight just how and where those in possession of the full facts of the situation may deem proper. He will be, as it were, a drop in a pool of labour to be tapped on behalf of any works engaged in munitions making.

The spirit of the hour predisposes us to accept without hesitation the principles of a bold scheme that appears to illustrate the workings of the British genius for adaptability in a crisis. Coming to details, there is much to show that the Minister of Labour has kept well in mind the essential practical bearings of his proposals. Thus the names of the four Directors of Labour Supply inspire confidence as those of men having long experience not only in the control of men but also in the closely associated aspects of production and lay-out. It is particularly gratifying—and we do not mean this in any narrow professional sense but rather as indicating official realisation of a vital point—that one of the four Directors should be an electrical engineer with the intimate knowledge of the problems involved that is possessed by Mr. A. P. Young.

Existing Framework

By working in conjunction with employers' associations and trade unions, the new organisation will be planted in firm soil. Best results will be achieved if existing machinery of negotiation is used as much as possible, *e.g.*, the Joint Industrial Boards and Councils for the supply section, in connection with which the E.P.E.A. and the E.T.U. have proved their capabilities; the union last named together with the A.S.E.E. and the contractors' associations; and, of course, the B.E.A.M.A. and the C.M.A. as representing other sections of the industry.

Hours of work and dilution of labour are matters on which such bodies are fully competent to give essential advice. While a good deal of dilution will certainly be necessary, there is much to be said for Mr. Bevin's own view that the working of longer hours is likely to make the best use of skilled men and to reduce the amount of dilution with its possible complications hereafter. The unions can also do good service by helping to train men for promotion to the more skilled grades. Many of these will come from the Ministry's training centres and the younger ones from technical schools. There is also the question of mobility of labour to discuss; this will be made easier by the proposal to allow lodging money to married men who have been sent from their home towns to other localities.

Using Expert Knowledge

Good use is to be made of experience already gained in local labour conditions by the transfer to the Ministry of Labour of the present Area Boards set up by the Ministry of Supply, and the appointment of Divisional Controllers (who direct the employment exchange service) as chairmen of these Boards. In their task these Controllers will have the aid of officers chosen for their special knowledge of industrial conditions. In order to ensure that skilled labour is everywhere used to the best advantage, a certain amount of official supervision will be called for. In the appointment of the 400 to 500 inspectors which, it is estimated, will be required, the spade work done by the engineering institutions in assisting the Ministry last year in compiling the voluntary National Service Register will no doubt prove of considerable service. Presumably also the "placing panels" of the I.E.E. will be the main instrument of supplying the electrical men required in supervisory grades.

The request that professional engineers enrolled in the Central Register and able to take on national work immediately should communicate with the Ministry does not necessarily imply that they are to give up their present occupations at once, but such a notification will undoubtedly facilitate the arrangements now being made for rapid expansion of production. Engineers not already registered will be informed later as to what is expected of them.

Superficially, the new scheme does not affect greatly the position of technical men, thanks to the preliminary organising work of the institutions. Actually it does herald a new drive, a considerable speeding up in procedure, a greater flexibility in

working arrangements, and, in addition, a help in the making up of minds. Those who doubt whether their present work gives them the greatest opportunity of contributing to the national effort will have an earlier opportunity of using their skill and training where it can best be used in safeguarding their own future and the future of civilisation.

Square Pegs

AT last week's annual meeting of the Association of Supervising Electrical Engineers reference was made to the fact that electrical engineers serving with the Forces were not always employed on work for which their qualifications fitted them, and a resolution was passed deploring this state of affairs. The subject is one which has been raised in many quarters, and now that the whole situation is under review it is to be hoped that the position of serving engineers will be considered. It may be that many of them could render better service to the nation by returning to civil occupations if the Services cannot make full use of them on work for which they are specially fitted.

I.M.E.A. Meeting Postponed

IN view of the present circumstances the I.M.E.A. has found it necessary to postpone indefinitely its annual general meeting which was to have been held yesterday. The decision will prove very disappointing to all concerned, whether supply engineers or not, but in these times such things are inevitable. We have already told our readers that we were arranging for a number of special articles to appear in our June 7th issue. These are now in hand and in spite of the postponement of the meeting we intend to proceed with their publication in the hope that they will compensate to some extent for the loss of the Association's annual convention.

Brighton to Pay Award

WE are pleased to learn that Brighton Town Council has now decided to pay the J.I.C. award of a halfpenny an hour increase to employees of the electricity undertaking. The question was referred back at the April Council meeting, and on Thursday last week the Electricity Committee, having further considered the matter, recommended that the Council should abide by the award. Councillor F. G. Field (chairman) said that the Committee had passed the resolution by seven votes to six. The majority felt that having accepted the obligation imposed by membership they should at least honour it. Here was an opportunity to restore the opinion that Brighton was an honourable Corporation. Discussion at the Council meeting was mostly in favour of the Committee's resolution. It is to be hoped that the question of membership of all Joint Industrial Councils, which was left with the Finance Committee, will also be amicably settled. The Council's action may influence other authorities who have taken objection to the award. Earlier this month Worthing Town Council decided that the halfpenny increase should not be granted.

The Chester Scheme

LAST week (as reported on page 596) a Divisional Court dismissed the Chester Corporation's application for rules directing the Electricity Commissioners to hear and determine according to law the Corporation's application for permission to extend the Queensferry generating station and to quash a decision of the Commissioners refusing this permission. The Commissioners held a public inquiry early last year at which estimates put in by the city electrical engineer (Mr. S. E. Britton) showed that the extension would save Chester over £91,000 in the years 1942-1945; the expenditure involved was £397,280. It was suggested on behalf of the Central Electricity Board that continuity of supply would be better ensured by a supply from the grid, and certain technical criticisms were raised which the Corporation maintained could easily be met. Although the Commissioners could not accept the estimates in their entirety, they agreed that the Corporation would be able to give an adequate supply at a cost lower than if it obtained energy from the Central Board. Nevertheless, they decided to take into account Section 18 of the 1926 Act and refused permission to borrow the necessary money. This Section provides that in determining whether to give or withhold consent to loans the Commissioners "shall have regard to the provisions of this Act and the effect of any scheme or schemes thereunder."

"Vigorous and Forceful"

ONE of the earliest municipal reports for 1939-40 comes from the Yorkshire woollen centre of Morley, where Mr. Norman Hunter's policy has resulted in a large number of the mills being electrified. Last year the undertaking's sales increased by 32½ per cent., with public lighting as the only class of supply showing a decrease. Last month there was a record increase over the output in the corresponding month of 1939. In the past five years the undertaking's connected load has risen from 4,930 kW to 11,320 kW, and "units purchased" from 2.9 million to 6.9 millon. The war has caused a partial check n the domestic sphere, but Mr. Hunter holds that it is the Council's duty to maintain the hire and other facilities, "especially as we now have to face keen competition from the local gas company." Gratifying as the increase in consumption is, he feels that the position of the undertaking still leaves much to be desired, and recommends, with typical Northern distrust for the *laissez faire* attitude, that a "vigorous and forceful development policy should be adopted."

An Oil-less Breaker

MAGNETIC air circuit-breakers have made little headway for AC operation in contradistinction to their common use on DC circuits. In comparison with oil-immersed switchgear they have the disadvantages of large size and exposed flame and of causing visual and audible disturbance. On the other hand, they have the merits of reliability, suffering little deterioration during interruption, and of simplicity of construction. A new type for voltages between 2 kV and 5 kV, the "Magne-Blast" breaker, which is described in *Electrical Engineering* (the American I.E.E. Journal), is claimed to be free from defects while retaining the good points of previous designs. An interleaved chute provides a serpentine path for the arc, increasing its resistance by cooling and lengthening it. Rate of rise of recovery voltage is said to be kept to a harmless value. The compactness of the unit is due to its adaptability to vertical-lift metal-clad form. While the design would no doubt lend itself well to situations where frequent operation is called for, it does not appear to possess the same advantages for general purposes of simple mechanical construction with few working parts obtained with oil-immersed switchgear.

Accelerated Annealing

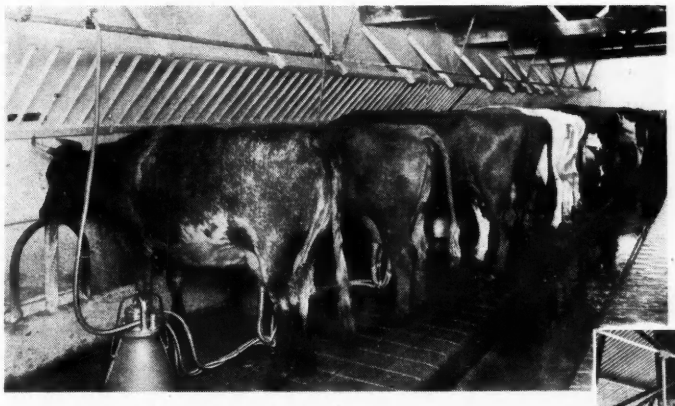
FAVOURABLE reports have been received of a method adopted at Schenectady for reducing the time occupied by the stress-relief heat cycle for large fabricated and cast structures. To cool the charge in a 2,000-kW 100-ton electric furnace from temperatures between 1,100 and 1,200 deg. F. frequently prolonged the cycle to 100 hr. By installing a fan with a duty of 4,500 cu. ft. of air per hr. at 4 in. w.g. and automatically adjusting the air intake by means of pyrometer-controlled louvres, the cooling rate has been increased from 11 to 43 deg. F. per hr. In this way a saving in overall time of 60 per cent. is said to have been made, with a reduction in annealing costs varying from one-third to one-half and an increase in furnace turnover by 150 per cent. Apart from production considerations, the saving in time would materially reduce the standing charges on the furnace by spreading them over an increased output, and would no doubt do much towards removing an obstacle to more extended use of electricity in the heat treatment of metals.

RURAL ELECTRIFICATION

Success of Methods Employed at Bedford

THE necessity for producing more food at home is likely to present farmers with an increasingly difficult problem as the war proceeds and more and more farm labourers are called up. They are also faced with the need for ensuring the maximum yield from their crops and livestock and for avoiding wastage and loss through such causes as insect pests, frost, etc.

In these and many other respects electricity will be found of immense assistance, and the importance which the Government attaches to its use will be evident from more or less official pronouncements and from the comparative ease with which sanction to loans for rural development work can be obtained. It will probably be remembered that the Electricity Commissioners in a circular issued last February with regard to the raising of loans intimated that the kind of work that might justifiably be undertaken under present conditions might include the provision of supplies for assisting or augmenting agricultural or horticultural production.



Electric milking at Tinsley Park Farm

In the circumstances, therefore, it is particularly interesting at the moment to investigate the various ways in which electricity is now assisting farmers in one of the areas where domestic electrification has been most intensely developed, and also to see how the electricity undertaking concerned has encouraged the extension of their use.

At Bedford the Electricity Department inaugurated as an experiment in 1930 a special scheme sponsored by the Electricity Commissioners to demonstrate the applications of electricity in rural areas and to discover the response made by farmers to whom these amenities were made available. Actually the Corporation made its start in rural development in 1924 when its first Extension Order was granted. This first stage, covering about 100 sq. miles of the Department's 200 sq. mile area, met with considerable success. In the "demonstration area" covering a further 100 sq. miles, mains were laid to practically all points where supplies were likely to be required, irrespective of whether prospective consumers had indicated their desire to take supplies. No guarantees of consumption were required, and this happy state of affairs continued until the war broke out. Now, however, if a substantial amount of mains is necessary, consumers are asked to make some contribution to the cost.

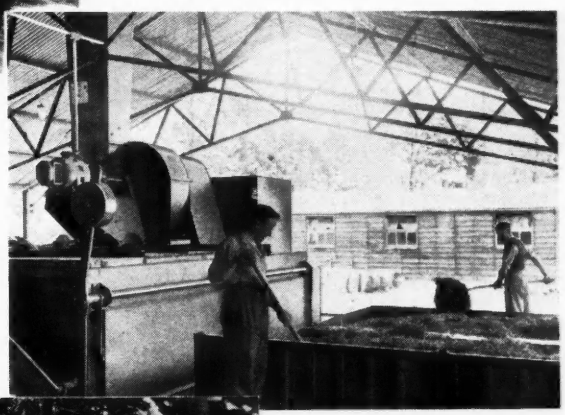
In the initial stages of development extensive and satisfactory use was made of a travelling trailer showroom. More recently, however, now that the novelty has to some extent worn off, local exhibitions held in village halls have been found more effective, though occasional use has been made of the Jackson cooking demonstration van. These propaganda methods are, of course, directed mainly towards encouraging the use of electricity generally and more especially for domestic purposes.

Getting farmers to adopt new ideas for agriculture or horticulture presents a different and more difficult problem, which can usually be solved only by persistent, personal contact on the part of the sales staff. But once convinced of the merits of electricity, as they cannot help being eventually, they are generally most enthusiastic in their praise for electricity and would on no account go back to other methods. The ways in which electricity can help on the farm are, of course, legion.

Dairy Farming

On the dairy farming side, no farmer can be considered up-to-date unless he employs it at least for milking, cooling, sterilising, bottle washing and refrigeration, and on both of the typical dairy farms (Tinsley Park and Mr. Ream's Portobello Farms) to which Mr. H. B. Jenkins, the deputy borough electrical engineer, and Mr. H. Davies, sales engineer, took us when we visited the area a few days ago, apparatus to deal with these duties was installed. An electric motor to drive chaff and root cutters, etc., is another device which a farmer would not be without once he has installed it. In fact, Mr. Hedges, of Houghton Manor Farm, Houghton Conquest, declared that a 10-HP unit driving all his cattle food preparation machinery, as well as a small flour mill, was the best investment he had ever made and he was particularly pleased with its quick starting properties in cold weather.

Portable motors can be employed too in innumerable ways, and Mr. Ream has substantially reduced his water bill by installing a pump driven by a 1-HP motor. Incidentally, regarding pumping, an interesting application of electricity is to be found at Burgoyne's Farm, where the provision of immersion heaters enables water from a well to be employed directly in hothouses. Pumping on a larger scale by the various local water undertakings also accounts for a good deal of load and it was interesting to note at the water works at Aspley Guise what a big saving in space has been effected by substituting electric for suction gas plant.



Grass drying at Starey's Farm, Milton Ernest, and (left) a device for taking the chill off water pumped from wells at Burgoyne's Farm, Maulden

Actually the Bedford area is not concerned to a large extent with dairy farming, the principal activities being market gardening. In fact, the east and south of the area forms almost one continuous belt of market gardens. As a result, it is in horticulture that perhaps the most interesting developments have been made. Considerable progress has been made in soil heating, which is used very extensively at many farms, including Mr. Lodge's at Blunham Grange, where the hothouses are also heated by means of thermostatically controlled tubular heaters. Here too, as well as at Mr. Humphrey's farm at Maulden and elsewhere, electric soil sterilisers are

utilised extensively. By this means not only are the plants grown more healthy and entirely free from insect pests and weeds, but they reach maturity much earlier. Mr. Wildish told us at Blunham Grange that electric sterilisation is immeasurably superior to the steam method and the cost worked out at only about 1s. 3d. a ton with electricity at 0.3d. per kWh, the time required per ton generally being about 1¼ hours. The heating of chitting houses for starting off potatoes by means of tubular heaters is fairly widespread and we were shown one installation at Roxton House. Another example of a recent application of electricity, grass drying, is to be seen at Captain Starey's farm at Milton Ernest.

Though not either agricultural or horticultural, further extensive rural use of electricity is to be found at the numerous gravel works in the district. At the Bedford Washed Gravel Co.'s works at Willington, one of several almost identical equipments, two 10-HP motors are employed, one to drive the screens and water pumps and the other the winch which hauls up the trucks of ballast to the head of the screens.

Loss of Brick Load

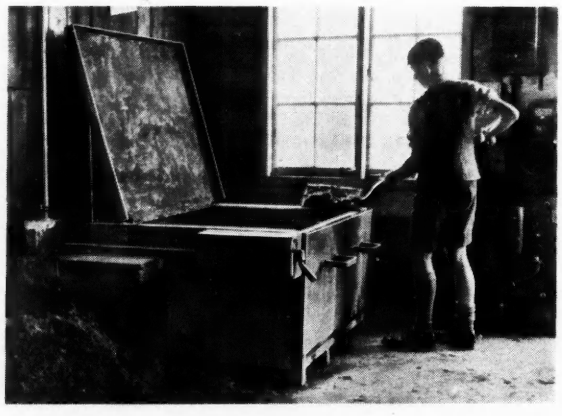
At the moment the undertaking is exploring ways and means of compensating for the serious falling-off in load required by the largest class of rural consumer, namely, the six huge brickfields situated in the western and south-western portion of the area. Before the war these had a combined demand of 5,000 to 6,000 kW. Now less than 3,000 kW is required and then only for short periods, instead of three shifts. Moreover, the neighbouring villages are so dependent on the general prosperity of the brick industry that there has inevitable been a reduction in domestic consumption. In fact the undertaking has in this district a potential capacity for about 10,000 kW lying practically idle, and looks to a further extension of its other rural supplies and the development of new industries to make up for this as far as possible.

Be that as it may, as a result of its efforts the Bedford Electricity Department can already boast no fewer than 393 farms connected. It cannot be claimed that their consumption is high, each on an average using about 2,000 kWh per annum and representing a revenue of only about £10. These figures relate solely to consumption for purely farm purposes and in addition considerable supplies are taken for domestic purposes.

A 3-HP single-phase truck motor operating a hay elevator at Jackman's Farm, Bedford

In point of fact, domestic supplies both in farms and in ordinary residential premises, represent about 30 per cent. of the energy disposed of in the rural area, amounting to 11,405,442 kWh out of a total of 38,718,269 kWh last year. In this connection, Mr. Jenkins expressed the view that the only way that rural electrification could be kept alive was by the inclusion of considerable numbers of residential consumers who derived their incomes from the towns or from industry and who appreciated country life, yet demanded the amenities of town life obtainable by the use of electricity.

The number of premises of all kinds connected in the rural areas is remarkably high, being in the neighbourhood of 75 per cent. of the total (25,700), and few undertakings can better the Corporation's record in connection with domestic apparatus connected. Actually about one in three of the total of 24,300 domestic consumers, considering the undertaking as a whole,

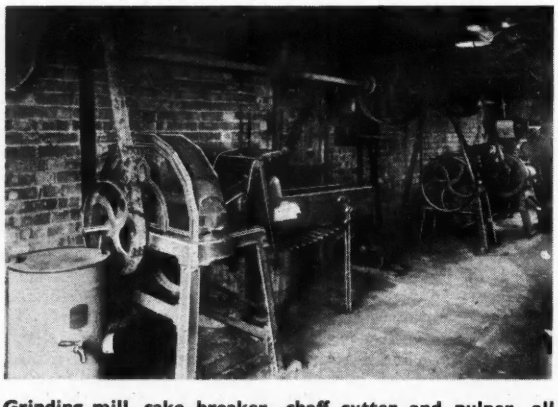


Shovelling soil into an electric steriliser at Humphrey's Farm, Maulden

has an electric cooker, and one in four a water heater, the proportion being slightly higher in respect of the rural area taken separately.

Prospects for the further development of the area are very favourable in view of the low charges, especially under the two-part tariff. Under this scheme, quarterly meter consumers obtain 3 kWh in the winter and 1 kWh in the summer quarters per £1 of "electrical assessment" at a "high rate" and the remainder at a "low rate." Prepayment meter consumers pay for 2 kWh in each quarter at the high rate. The electrical assessment is almost the same as the rateable value, except that it is proportionately lower in the case of assessments above £12 per annum and slightly higher in the case of the lower rated properties outside the borough and in the Kempston urban district. The high rate is 5½d. per kWh in the borough, 7½d. in the area between the borough boundary and a three-mile radius, and 8d. in the remainder of the area. The corresponding low rates are ½d., ¾d. and ¾d. A discount of 2½ per cent. is allowed for cash in 14 days, but as from the June quarterly meter readings the charges are subject to a 10 per cent. increase. As already mentioned a special tariff for greenhouse and water heating is also available at 0.3d. per kWh, subject to the discontinuance of the supply between 7 and 9 a.m. and 4 and 6 p.m. from November to February.

We wish to thank Mr. P. G. Campling, the borough electrical engineer, and also Mr. Jenkins and Mr. Davies for their assistance in the compilation of this article.



Grinding mill, cake breaker, chaff cutter and pulper, all driven by an 8-HP, 3-phase motor at Duck's Farm, Wilstead. The 10-gal. wash boiler on the left is used for heating water for pig food, etc.

Moisture in Cables

AMONG the several papers presented at the May 24th meeting of the Physical Society in London was one by Messrs. R. S. Vincent and A. Simons in which they described a sensitive method of determining the amount of moisture in electric insulating materials, such as paper, whether impregnated or not, down to values of the order of 0.01 per cent.

The authors have employed a new form of absorption apparatus for establishing the equilibrium water-vapour pressure of a sample at a chosen temperature in a known space. From such measurements the original total adsorbed moisture in the sample can be derived by simple graphical extrapolation. Once the relation between the equilibrium vapour pressure and the percentage of moisture has been determined for a particular material, a single vapour-pressure measurement suffices to make known the moisture content of the sample. Tests can be carried out with samples containing as little as 0.1 gm. of paper, thus making it possible to explore the distribution of moisture through the insulation wall of a high-voltage cable.

TECHNICAL PROBLEMS

Solution by Approximate Methods

By F. Peasgood, A.M.I.E.E., A.M.I.A.E.

IT is the purpose of this article to show that technical problems may be solved by approximate methods, provided such devices are applied with discretion and knowledge. The untrained technician views with suspicion any method which gives the impression of guesswork, while the strictly orthodox methods of attack are usually preferred. If the final answer can be squeezed to give an apparent accuracy of three figures the intense satisfaction is such that complete confidence is placed in the results.

The over-trained engineer is, however, inclined to worry about details. The problem, especially if it is practical or commercial, is usually so complex that the essential points cannot be extracted from the maze of calculations and the mathematical physicist is often unable to recognise the usefulness or the application of his results.

It is well known that an advanced student will fail to pass an elementary examination simply because he reads into the question considerably more than was originally intended and certainly more than is required. It is the same when a college-trained physicist is allowed to run wild in a works design office, test room, or research department. The itch to design new and often impossible parts and the enthusiasm to remould the whole industry is a costly period for his employer, but slowly, by means of a series of setbacks, a few engineers reach the "understanding" stage.

This period of unproductive effort and waste could partly be avoided by arranging that engineering problems should be presented at an early training period by engineers and solved in such a manner that students are able to appreciate the commercial, practical and technical aspects simultaneously. The first consideration should be "cost justification" and the decision must be made by those in authority. The technician may prepare a report giving full details of possibilities, costs, risks, &c., but he should not waste time in "tinkering" or allowing himself to drift into a cloud of ideals when he is paid to produce results.

It is admitted that the dreamer may produce a "golden egg," but too much time has been wasted upon the fixed idea that "golden eggs" are always just around the next corner. To devote money purposely to research work with no immediate gain required may be necessary and in certain circumstances very desirable.

A designer may be required to make such a calculation as

$$\frac{2.14\times 3.96\times 10^4}{431.2\times 9021.}$$

The first thoughts should be: how important is this answer to my particular problem; what degree of accuracy do I require; what accuracy may I expect from my figures; what time is justified for the calculation alone. If the answer is a trial design figure then an approximation could be made as follows: $2\times 4\times 10^4/4\times 10^6=2\times 10^{-2}=0.02$. A slide rule would give 0.0218, and assuming that the figures were originally correct to three significant figures an answer of 0.022 would represent the limit of accuracy under the circumstances.

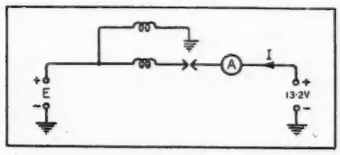
The technician who used four-figure logarithms and obtained 0.02178 might be pleased with himself, but probably unable to complete the whole problem in a commercial time. The whole difficulty is that before a technician can solve problems by approximate methods he must have worked through similar questions by the standard methods, i.e., he must first be trained to think for himself, he must thoroughly understand the fundamentals of the subject, and then slightly lowered by an "ageing process" so that as a finished product he is useful to the industry he is about to serve.

The following problem is given to illustrate the points mentioned. The figures are not intended to be more than a mere example, the electrical theory has been made purposely simple, but the method of attack deserves study.

Question.—An accumulator is connected to a DC supply by means of a battery cut-out. Determine the value to which the supply EMF must fall to cause the cut-out to disconnect the battery from the supply, also the value of the discharge current at the instant of break. Assume that the EMF of supply is 20 V and constant internal resistance 0.2 ohm and that EMF of battery is 13.2 V and constant internal resistance 0.1 ohm. The series coil on cut-out consists of 10 turns of No. 16 SWG copper wire, 1 ohm resistance, and the shunt coil 150 turns of No. 28 SWG copper wire, 50 ohms resistance. The spring tension is such that the contacts open when the effective excitation is reduced to 20 ampere-turns and cuts in when the PD across the pressure coil is 15 V.

Solution 1.—Considering the problem in a general way the following points are noticed: Cut-in PD is unnecessary, contact resistance is not mentioned, figures suggest a motor-car charging unit, size of wire does not affect the problem, internal resistance of battery assumed constant (indicating that approximate solution is the only one possible), data apparently only accurate to two significant figures and only one figure in the case of the battery resistance.

Although the cut-in voltage is not required, quickly examine: shunt current = 15/50 = 0.3 A and excitation 150×0.3=45 ampere-turns. When the shunt coil closes the contacts, the charging current will increase this excitation and hold the contacts firmly together. Assume that the charging current is zero, i.e., approximately E=13.2 V. The pressure coil current=13.2/50 and shunt excitation=(13.2×150)/50=39.6, say, 40 ampere-turns.



The demagnetising ampere-turns must therefore be approximately equal to 40−20, i.e., 20, and this excitation will have to be provided by the battery discharge current and the shunt-coil current. The latter current will be small compared with the discharge current and because of the small number of series turns its magnetic effect could for the time being be ignored. Discharge current=20/10=2 A. If I is −2 then

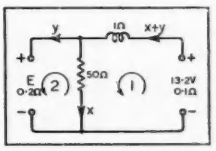
$$\frac{E-13.2}{1+0.1+0.2}=-2 \text{ and } E=10.6 \text{ V.}$$

The P.D. across the shunt coil will be 10.6+(2×0.2), i.e.=11 volts, and the value of shunt excitation is approximately (11×150)/50=33, which in turn indicates 33−20, i.e., 13 demagnetising ampere-turns required. The new approximate value of discharge current=13/10=1.3 A and new value of E=11.5 volts.

Check. — Shunt current=[11.5+(1.3×0.2)]/50=11.76/50=0.24 and reverse current in series coil=1.3+0.24=1.54 A. Demagnetising ampere-turns=15.4. Shunt ampere-turns=(11.76×150)/50=35 approximately, ∴ effective ampere-turns =35−15=20.

Solution 2.—(1) $50x+1.1(x+y)=13.2$ (2) $0.2y-50x=-E$ (3) $150x-10(x+y)=20$.

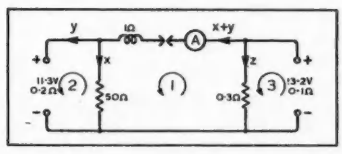
Solving the above equations we have: $x=0.23$, $y=1.27$, $(x+y)=1.5$, E=11.3.



V=11.3+(1.27×0.2)=11.55, ampere-turns pressure coil=(11.55×150)/50=34.65=35 approximately, ampere-turns series coil=1.5×10=15, ampere-turns effective=35−15=20.

The impression may have been created that the second solution is quicker and better than the so-called "short method." Actually, apart from the detailed explanation, the figures only involve the use of a slide rule, whereas all the calculations in the second solution have been omitted.

There is no point in making the figures unnecessarily difficult, but the problem could be made more complicated by connecting a starter motor with an assumed equivalent resistance of 0.3 ohm direct across the battery. The new problem would be to determine the value of the battery current under the revised conditions. Accepting the value of E as 11.3 as previously calculated we have: (1) $50x-0.3z+1(x+y)=0$.



(2) $0.2y-50x=-11.3$.

(3) $0.3z+0.1(x+y+z)=13.2$.

Solving the above equation we have: $x=0.22$, $y=-1.25$, $(x+y)=-1$, $z=33$ $(x+y+z)=32$. Battery discharge current=32 A.

Solution 2.—$I_b=13.2/0.4=33$ A.

If an advanced example had been chosen the difference between the two methods would have been more marked, but the theory involved would have obscured the real value of the approximate method of solution.

I.E.E. Benevolent Fund

THE hon. secretary of the I.E.E. Benevolent Fund has drawn the attention of subscribers to the benefits derived by the Fund by the employment of a deed of covenant. Under the provisions of the Finance Act, 1922, the Fund is able to recover income tax on subscriptions, provided the subscriber agrees to pay a fixed amount for a period of at least seven years. With income tax at the present high rate this adds considerably to the subscription and involves no trouble to the subscriber. A form has been prepared and circulated to subscribers.

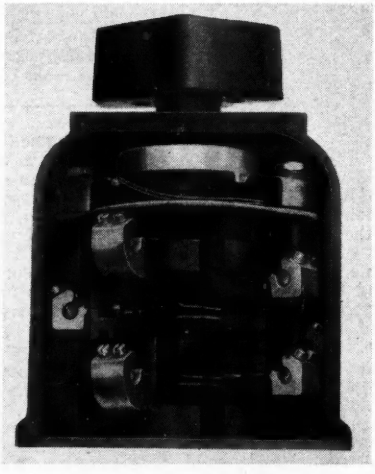
ROTARY SWITCHING

Wide Field of Application

By R. W. J. Cockram, A.M.I.E.E.*

WHERE anything more complicated than a simple two-way multi-polar sequence is required of switching apparatus, the conventional type of hinged knife switch, with its elaborate inter-polar and inter-switch connections, becomes a cumbersome form of control which, even in its contactor form, has for certain applications a number of inherent disadvantages. Under such conditions the use of a rotary switch, with its easily provided intricate circuit combinations and reduced space factor, should be considered.

In the rotary packet form it consists essentially of two main portions, viz., discs of moulded insulating material which house the terminals, rotating contacts and the operating shaft for these and, secondly, the operating mechanism, which is usually of the quick-make-and-break form, giving automatic location of the positions of the switch. Any number of positions may be provided but six is the maximum generally found to call for a sufficient demand to justify production costs, the four-position switch being the more usual form.



Sectional view of rotary switch

A rotating contact, accommodated in the chamber formed by placing the moulded discs of the first portion face to face, makes connection between any two of three terminals located in the chamber. Further circuits can be controlled by adding discs, terminals and rotating contacts. Intricate control can be accomplished by arranging the relative positions of these parts so that each circuit is made in the required position. In addition, inter-terminal connections may be made along the exterior of the barrel formed by the discs. As a result any required combination of terminal points to be controlled may be obtained for each position of the switch. Where quick-make-and-break operating mechanism is used rotary and reciprocating, rotary and non-reciprocating and reciprocating but not completely rotary control may be readily provided.

Rotary switches can be built for maximum values of 180 A and 660 V for rupturing capacities not exceeding 25 kVA. The greatest field of application lies in general purpose switching where a comparatively large number of terminal points have to be controlled in a small space. Fig. 1 shows how the control of four differing combinations of thirty-two terminal points required on a test panel was provided by a single switch with economy of space. The switch sequence schedule for the four positions is:—(1) 1-2, 5-6, ... 29-30; (2) 2-4, 6-8, ... 30-32; (3) 3-4, 7-8, ... 31-32; (4) 1-3, 5-7, ... 29-31.

While the surface mounting area is constant for a switch

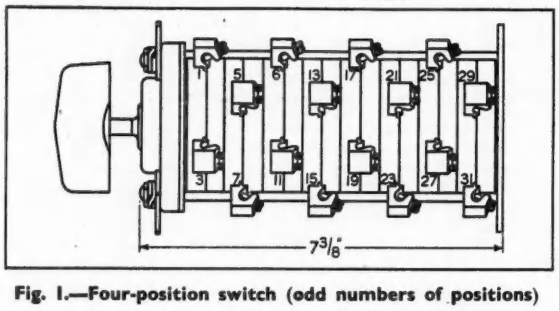


Fig. 1.—Four-position switch (odd numbers of positions)

of given rating and number of positions, the projection varies according to the number of discs required to give the sequence. The rating of the switch in the above example is 30 A at 250 V per pole, but the 10- and 20-A four- and six-position switches which have similar design characteristics are relatively even smaller.

These small space factor values are due to the very short electrical path in the switch and to the presence of large terminal blocks for providing connection. The heat produced in the short path inside the switch is thus absorbed and dissipated to the atmosphere by the terminal lugs. In this manner the temperature rise inside the switch is within the limits of B.S.S.861. The rating of these switches is sometimes doubted by the discriminating engineer, but in all cases which have come to my notice I have found that on test the ratings applied are at least 40 per cent. on the safe side. Experience shows that the contact resistance remains constant throughout the life of the switch, making the latter of considerable utility in metering applications.

In a comparatively recent design a single-pole thermostat has been arranged to give automatic control of a set of heating elements for three heat-combinations in which two banks of elements are connected alternatively in series, in parallel, or one bank only across the line. Previously a double-break thermostat was necessary which had a number of inherent disadvantages. The switch in this case was designed to give double-pole protection to the elements and pilot indicating lamp and required a total of six discs in its make up.

Heating appliance control, the forms of which are very varied, provide a considerable field of application. The many forms of battery control and charging arrangements also offer scope for rotary switches. Several manufacturers of rectifier equipments have found them to be a necessity rather than a refinement in order to minimise size and weight.

Remote control by rotary switches has advantages over the conventional push-button station method. Fig. 2 gives the connections of remote control of a contactor-type starter from a number of points. Push-button control would have necessitated a third connecting wire between stations. Although self-resetting overload relays cannot be incorporated, this may be an advantage as such relays are often applied where the hand-reset type would provide a better form of protection. The rotary switch may also be easily constructed for watertight enclosure which is difficult to do with push-buttons.

As belt and countershaft give way to individual machine drive, control gear has become more prevalent and requirements as to space have become more exacting, especially where machine-tool manufacturers require the control to be incorporated in the castings of the machines. This is practically an "untapped" field of application to which the rotary switch in its cylindrical form is admirably suited. Simple "on" and "off," single-phase, split-phase, capacitor, and star-delta forms of starting are easily covered and in addition speed control may be achieved by the usual pole-changing methods. Where fuses are sufficient protection they can be incorporated along the barrel of the switch.

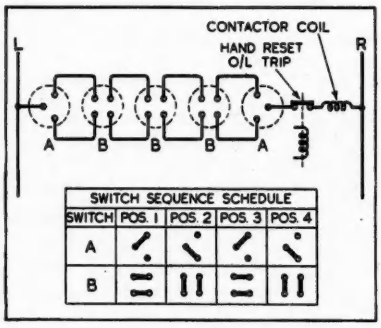


Fig. 2.—Remote control of contactor starter

The rotary switch can also be arranged to give any required sequence without the necessity of producing large quantities of a particular design for sale at a competitive price. As a result the design of the equipment is unhampered by limitations of the control methods used and the control required can be left to the designer of the rotary switch who can produce any required combinations without difficulty, providing the rating and number of circuits is not excessive. On the few occasions when a single switch cannot meet all requirements the addition of another switch will generally do so.

*Rotary switch engineer, Santon, Ltd.

I.E.E. Centre Reports

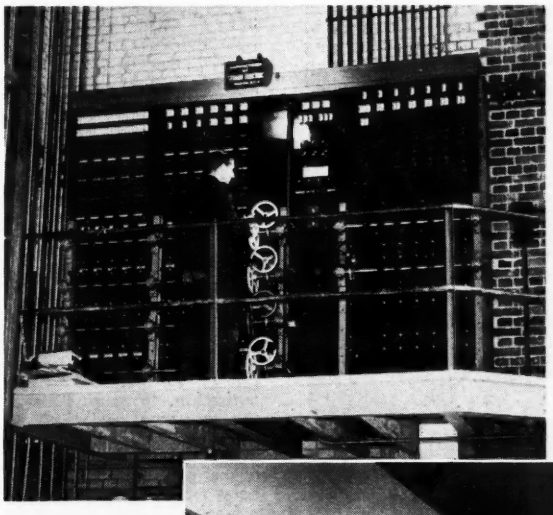
THE annual report of the North-Eastern Centre of the Institution of Electrical Engineers shows that eight meetings were held this year. There was an average attendance of 30 at the six meetings of the Tees-side Sub-Centre. The North-Eastern Students' Section held ten meetings, the average attendance falling slightly to 45. The membership increased slightly to 756, including 134 on Tees-side and 119 graduates and 157 students.

BRIGHTON'S NEW THEATRE

Attractive Lighting Effects and Flexible Stage Equipment

IN the new Imperial Theatre at Brighton the architects, Verity and Beverly, FF.R.I.B.A., have convincingly expressed the character of the town in decorations and reliefs which add distinction to the modern architectural background. Those concerned electrically may well be proud too, for the "atmosphere" which has been so successfully sought in the general scheme has not only been preserved under artificial light, an achievement in itself, but actually enhanced.

The auditorium is illuminated by a continuous lighting cove down both sides of the main ceiling and across the proscenium opening. At 9-in. intervals in this cove 40-W pearl lamps are installed, giving it a total load of 11 kW. A further 5.25 kW of lighting is distributed over the auditorium in decorative fittings and plaster features. The whole of the auditorium lighting is controlled by a fully automatic motor-driven dimmer in a special room on the upper circle, and push-buttons for the remote control of this unit are installed in the projection room and on the main stage switchboard. In addition to the usual "up," "down" and "stop" controls a short-circuiting contactor enables the lighting to be put on immediately in an emergency.



Stage lighting control centre, showing neat layout of combined switch and dimmer

From a switchroom off the entrance foyer the entire front-of-house lighting can be controlled. The entrance hall is lighted by a rectangular recessed dome equipped with 25-W sprayed yellow lamps and four decorative glass and metal fittings, while for the stalls promenade between the entrance foyer and the rear stalls there are a nine-light chandelier and four-pendant cylindrical lantern fittings. The lighting of each of several refreshment saloons is effected by decorative metal and glass fittings which, in common with all other decorative fittings installed, were manufactured by Best and Lloyd, Ltd. In addition to a series of ceiling fittings for the main stairs to the dress circle there is in a dome at the head of the stairs a very attractive 33-in. diameter metal bowl pendant with nine 40-W pearl lamps.

Left: Dignified treatment of the ample proscenium. Above: Interest is added to the entrance hall lighting by the spacious effect from the mirrors

The stage has been equipped so as to cater for trial productions of London shows as well as touring performances. Special care, therefore, has been taken to prevent noise in operating the stage switchboard, all the heavy black-out and colour master contactors being remotely controlled from the stage and situated in the basement below. This switchboard, which is of Strand Electric dead-front design, incorporates 53 dimmers arranged in four colour banks, together with an independent bank, and the shafting of the various colour banks is equipped with special interlocking for main gang control.

An independent 100-A circuit provides ready connection for touring companies with their own switchboards. The five battens and the footlights are arranged for four-colour lighting, while the footlights are sub-divided into three sections on each colour, each section having its own dimmer. There are ample stage plugs for three-colour working, as well as independent ones for small circuits, one-way plugs on the perches for incandescent spots and others for stage arcs.

Concealed in the front of the circle are twelve Strand Electric 1,000-W spotlights to give front illumination to the stage, and each of these is controlled by its own switch and dimmer from the stage switchboard. The total stage loading is 134.6 kW, and in addition there is 110.4 kW of load from six 80-A projectors. By a visual and audible signalling system the stage manager is in constant touch with all operating sections of the theatre, and an R.C.A. Photophone stage amplification system has additional speaker outlets in the refreshment saloons.

A four-wire, three-phase, 50-cycle, 230-400-V supply is taken from the Brighton electricity undertaking, and one wall of the intake room is occupied by the main distribution board, which comprises 15 ironclad panels, each fed independently from an ironclad busbar chamber at the bottom. All the wiring for this board, including main feeder cables and meter loops, is enclosed in sheet-metal wiring ducts.

An emergency-lighting rectifier also situated in the main switchroom is of the full-wave oxide-cathode type manufactured by Crypton Equipment, Ltd. It serves a 48-cell Chloride battery capable of maintaining the emergency lighting load of 2.9 kW for a period of three hours should the mains supply fail. During normal operation the battery "floats" across the rectifier and the emergency lighting is supplied direct from the rectifier.

The main intake room is in the basement underneath the entrance foyer and the layout of both the service equipment and the main distribution gear suggests close and efficient co-operation between the electrical contractors and the supply undertaking. The battery room is next to the switchroom and there is an intercommunicating door in the partition wall.

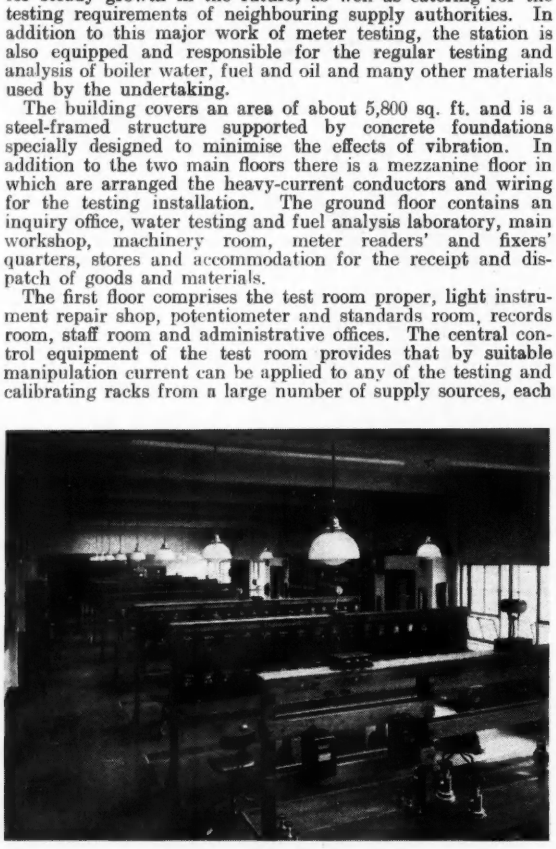
We are indebted to the Berkeley Electrical Engineering Co., Ltd., who were responsible for the complete electrical installation, for help in collecting the above information.

Meter Testing at Torquay

ALTHOUGH for many years the Torquay electricity undertaking has had its own testing department, which proved capable of meeting the requirements of the 1936 Electricity Meters Act, the additional work brought about by this Act and the rapid growth of the undertaking has given rise to the establishment at Newton Abbot of a completely new testing station. This is designed to meet the needs of the present 26,000 meters of the undertaking, with provision for steady growth in the future, as well as catering for the testing requirements of neighbouring supply authorities. In addition to this major work of meter testing, the station is also equipped and responsible for the regular testing and analysis of boiler water, fuel and oil and many other materials used by the undertaking.

The building covers an area of about 5,800 sq. ft. and is a steel-framed structure supported by concrete foundations specially designed to minimise the effects of vibration. In addition to the two main floors there is a mezzanine floor in which are arranged the heavy-current conductors and wiring for the testing installation. The ground floor contains an inquiry office, water testing and fuel analysis laboratory, main workshop, machinery room, meter readers' and fixers' quarters, stores and accommodation for the receipt and dispatch of goods and materials.

The first floor comprises the test room proper, light instrument repair shop, potentiometer and standards room, records room, staff room and administrative offices. The central control equipment of the test room provides that by suitable manipulation current can be applied to any of the testing and calibrating racks from a large number of supply sources, each



General view of the test room proper

source representing some specific condition or combination of conditions necessary for particular work at any moment. Hinged doors opening back into an adjoining passage-way provide facilities for inspection of the connections.

By means of two single-phase control units all the desired conditions of loading apparatus under test are provided quickly and easily, and with their associated precision instruments these constitute the major facilities for dealing with meters of average capacity. A specially designed 100-A loading device is complete with the necessary check meters which, by a rather novel method of attachment, may be removed or replaced in the minimum of time and trouble. A DC control unit is capable of handling current up to 1,000 A and is supplied by a machine specially designed for this purpose.

Two mobile testing units represent a somewhat original method of overcoming certain difficulties associated with long period dial testing. The oak testing racks and work benches are designed to accommodate every type of meter or instrument likely to be met with in everyday practice. By various operations on the main central switchboard any defective circuit can be immediately isolated and worked on with safety, and the board also affords complete and independent control of every electrical circuit throughout the building, including those for the battery, potentiometer and other essential apparatus. The independent controls are situated immediately adjacent to the chief tester's office, thus ensuring constant supervision. Testing loads are automatically stabilised and maintained constant to within very close limits of their predetermined values by means of a "Thyratron" control installation.

Two specially constructed work benches with control units attached and located near the centre of the control room are intended principally for the purpose of carrying out work of a comparatively incidental nature. At the rear of the main switchboard is the potentiometer room which is well appointed for the precision calibration of substandard instruments. This room also houses the standard pendulum clock, together with a receptacle for timing the numerous precision stop watches.

(*Concluded at foot of next column.*)

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Transformer Noise

WITH regard to the account in your issue of April 5th of the discussion on a paper by us entitled "The Limitation of Transformer Noise" read before the Institution of Electrical Engineers on March 28th, and in particular to Professor R. O. Kapp's criticism in regard to our statement in Section 3 of the paper that "Core vibration arises principally from the magnetostrictive effect in the core material," we should be obliged if you would allow us to remove any misapprehension there may be in the minds of your readers as to the source of the information on which this statement is based, pending our reply in the *Journal* of the Institution.

The statement is based upon research carried out by the authors between April, 1934, and September, 1935. By measurement of magnetostriction in strip specimens they demonstrated in 1934 the presence of magnetostriction in transformer steel and consequently in cores constructed with it. They also confirmed the non-linear relation between magnetisation and elongation previously observed by others. They observed in 1934 the harmonic nature of the sound spectrum, having a double frequency fundamental, emitted by a ring core under AC magnetisation, a natural consequence of the non-linear double frequency extension which they had observed. They also showed that the magnitude of the fundamental 100 cycles per sec. component of the radiated noise was of the order to be expected from the observed magnetostrictive extension.

As a further confirmation of the effective presence of magnetostriction, experiments were carried out in 1934 and 1935 on the basis of observing the noise after every other known cause had been eliminated. For this purpose jointless ring cores were used. The possibilities of the noise being due to vibration of the magnetising winding, to non-uniformity of magnetisation, to magnetic asymmetry and to eddy currents in the core were investigated and these effects were shown to be negligible. By this process of elimination the authors considered they had demonstrated that whether the core consisted of many laminations or a single one the primary cause of the noise emitted was magnetostriction.

Having satisfied themselves of the importance of magnetostriction and having determined by measurements that the core materials which were permissible from other overriding considerations, did not show any marked difference in this respect, the authors turned their attention towards the end of 1935 to the other aspects of the subject which occupy the bulk of the paper.

The research at University College, London, described by Professor Kapp in the discussion, was carried out in 1936 and the report describing it has not yet been published, being clearly marked "Confidential—Not for Publication"; otherwise reference would certainly have been made to it.

The main part of the paper is, of course, devoted to other methods of noise reduction which proved to have greater practical possibilities and are in no way dependent on the precise mechanism of the generation of the core vibration. While the authors' decision to concentrate on these other methods of noise reduction has so far been justified by the non-appearance of a new core material of low magnetostriction, yet the fundamental work on the subject at University College is important as aiming logically at the root cause of the matter.

B. G. CHURCHER, A. J. KING.

Trafford Park, Manchester, *May 23rd.*

(*Concluded from previous column.*)

A main single-polyphase control unit has been specially designed for the testing and calibration of meters and instruments under true polyphase conditions, but its utility is greatly extended by the fact that it can be made to serve as three independently operated single-phase equipments.

A key and buzzer system interlocked and arranged in such a way as to ensure entirely independent and individual control provides efficient signalling between the operators on the testing benches and the observers at the control units. There are also an instrument repair shop where meters and instruments are disassembled, repaired, and given preliminary tests after re-assembly, and a records office which is accessible both from the test room and the first floor landing.

The major electrical equipment was supplied by the following:—Plant and machinery, British Thomson Houston Co., Ltd., and Electro-Dynamic Construction Co., Ltd. Testing units, H. J. Fuller and Sons, Ferranti, Ltd., Chamberlain and Hookham, Ltd., and British Sangamo Co., Ltd. Potentiometer, Elliott Bros., Ltd. Battery, Chloride Electrical Storage Co., Ltd. Precision and various measuring instruments, Sangamo Weston Co., Ltd., F. C. Smith & Co., Crompton Parkinson, Ltd., and Everett Edgcumbe & Co., Ltd. Intercommunication telephone system, W. C. Davey & Co., Ltd.

The chief engineer and manager of the undertaking, Mr. G. J. Hollyer, M.I.E.E., was responsible for the design of the complete installation, and much of the major equipment was constructed entirely in the Department's own workshops.

REGISTERED ELECTRICAL CONTRACTORS

Annual Meeting

THE annual meeting of the National Register of Electrical Installation Contractors was held on May 24th, at the Institution of Electrical Engineers, when Mr. P. V. Hunter, the chairman, presented the report of the Executive Committee. Both income and expenditure for the year ended December 31st, 1939, showed a decrease over that of the previous year and the surplus was £228 as compared with £247.

Seventy-five new certificates were issued during the year as compared with 90 in 1938. During 1939 there were 68 applications for registration, of which 39 were accepted, 8 were declined and 3 withdrawn, 18 still being under investigation at the end of the year. The total number of applications up to May 3rd, 1940, was 3,657 and the number on the Register 1,650. The inspection work of the Register continued throughout the year and a separate report showed that 95 new applicants and 373 registered contractors were inspected, involving the examination of over 1,300 installations of all descriptions. Following visits, 10 contractors were removed from the Register for faulty work or refusal to allow inspection to be made. Fifty-five repeat inspections were made.

The head office and all branches of Electricity House, Ltd., Leeds, had applied for registration and inspection had been made of the work at all establishments concerned. A meeting between the Executive Committee and a sub-committee of the I.M.E.A. resulted in a clear understanding of both sides of the various matters raised. The Liaison Committee with the E.C.A. held meetings during the year and several matters arising therefrom were dealt with by the Executive Committee.

In presenting the annual accounts and balance sheet, Mr. W. R. Rawlings, the honorary treasurer, said that for the first time in its history there had been a drop (27) in the number on the Register, but thanks to the way in which it had been managed, there was no difference in the financial results and their position was practically the same as it was last year. They must not, however, overlook the fact that the present figures dealt with only four months of the war. What effects the present year would have upon their finances he was unable to predict. The total expenditure for inspection was a little more than half the total income, but having regard to the importance of this part of the Register's work, no one would begrudge the expenditure or wish to curtail its operation in any way.

The report and accounts were unanimously adopted and the nominations for membership of the Registration Board were confirmed. Retiring members of the Executive Committee, Messrs A. W. Barham, D. S. Munro and J. W. J. Townley, were re-elected and Messrs. P. V. Hunter and A. H. Dykes were also re-elected chairman and vice-chairman, respectively. Two proposals for the amendment of the rules were put forward. One of these provided that County Councils and other local authorities having electrical contracting departments should be eligible to apply for registration. Mr. Dykes suggested that these bodies should be allowed to register so that they could keep control over them. Mr. W. H. Walton, however, said that the Council of the E.C.A. was opposed to the proposal as it did not look upon these bodies as installation contractors. Mr. W. M. Selvey raised the question as to whether these authorities had powers to carry out contracts. If they had, he did not see how they could debar them from the Register. On the proposal of Mr. F. W. Purse it was agreed that the matter be referred back for further information to be obtained regarding the legal position. The other amendment proposed that the Register should retain the whole or any part of the registration fee of £5 5s. (instead of £2 2s.), in the event of an application being withdrawn or refused. This amendment was agreed to.

Mr. Hunter said that they had received an application from the Conference of Joint Electricity Authorities, Joint Advisory Boards and Joint Committees for representation on the Registration Board. After some discussion as to the status of this organisation, it was agreed that the question be deferred until it was shown that it was a properly constituted authority. A proposal had also been received from Mr. F. Johnston, that Northern Ireland should be represented on the Registration Board, and it was decided to inform him that the E.C.A. already covered Northern Ireland. It was also decided to contribute £10 10s. to the I.E.E. Benevolent Fund. A vote of thanks to the chairman was proposed by Mr. T. W. Heather.

Wartime Industrial Lighting

OPENING the discussion on Mr. Lingard's address at last week's conference on industrial lighting in wartime held at the E.L.M.A. Lighting Service Bureau (see last week's issue, page 568), Mr. G. H. Buckle (Wingfield, Bowles and Partners) mentioned the difficulty often found in deciding on any particular lighting scheme, and considered that 20 or even 30 ft.-c. was not adequate in every case—for instance, in sewing or handling black materials where 100 ft.-c. might be required. Mr. Buckle pointed out that as the average age of operatives was likely to go up as the war proceeded, the average level of sight therefore being lowered, better lighting was more than ever essential since optical aids could not do more than correct the vision. He appealed to factory managers not to economise in lighting in such places as stores. Lighting costs were in fact not worthy of thought at present in relation to the necessity for speeding up output. Standards of illumination, though much better than they were a few years ago, could still be greatly improved, and he would like to see working demonstrations of lighting given in an actual factory by E.L.M.A. There was still a large amount of glare in factory installations. Indirect lighting could be used more extensively but ceilings were usually dark. He suggested that artificial reflecting surfaces might be made and that the large sources now available might be utilised to a greater extent.

Mr. Mortimer Hawkins asked for more details of the tests that had been described, whether earning rates of operatives were affected, whether under increased lighting the actual dexterity increased also. He thought that perhaps the human element had been overlooked and the operative regarded too much as a machine under test. On the illumination of machinery, he had found that the painting of the metal where possible with light coloured paint brought a great improvement. Mr. Southern spoke of the difficulty of adequate lighting of modern machines; no general system was quite satisfactory, and even localised lighting did not cure the difficulty.

After other questions Mr. L. E. Buckell pointed out that lamp manufacturers could easily supply demonstrations of lighting in actual factories. Mr. Lingard in answer to Mr. Hawkins said that every element in the investigation on which the figures given were based had been carefully watched and that the best method of overcoming problems of lighting, speaking broadly, was to raise the whole standard of lighting over the whole of the working period.

Commencing the afternoon session, Mr. A. W. Garrett, H.M. Chief Inspector of Factories, said full advantage should be taken of all light permitted under the black-out. Many accidents were caused by lack of adequate lighting in passages, etc. There was a large amount of evidence that workers did not like completely blacked-out factories and though this was no doubt largely psychological the policy should be to get as much daylight as possible. The first idea in factories to-day must be increased production and if improved lighting was going to give even a small increase it was worth while.

On Mr. Atkinson's lecture Mr. R. W. Daniel (Ministry of Home Security) said that the needs were conflicting—good light for industry, yet no betraying light for possible aerial attack, and we had to arrive at a reasonable compromise. The misguided "blue lamp" propaganda at the beginning of the war gave rise not only to losses in production but to serious psychological interference. Workpeople missed the sunlight, and he thought that a certain amount of natural illumination was essential; if this was found impossible, the standard of artificial lighting used should be very high. Exterior lighting should be uniform, and should be installed by some person competent to ensure its proper use and effect.

Many speakers took part in the discussion that followed. Mr. G. H. Buckle emphasised the need for good ventilation where there was a heavy lighting load, owing to the heating effect. Mr. Garrett supported the argument for attention to ventilation, strongly recommending that a competent ventilating engineer should be consulted. Upon the question of the heating effect Mr. Atkinson pointed out that with fluorescent lamps this amounted to only about one-third of that produced by filament lamps. With regard to the possible nervous strain induced by constant work under artificial light he noted that one of the speakers had worked for years under these conditions and had not suffered any injury to health.

Ships' Cables

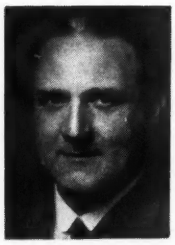
THE recently issued third edition of the I.E.E. Regulations for the Electrical Equipment of Ships contains references to B.S.S. 883 (cables) which has now become available. This new specification is welcome, particularly as cables for land use are now separately specified. It deals with rubber-insulated cables and flexible cords as well as with paper and cambric insulated cables, including those types used in propulsion circuits. Tests are specified also and there are two appendices, one relating to the identification of cores and the other to the spark testing of rubber insulated cables. Copies of the new specification are purchasable from the British Standards Institution, 28, Victoria Street, S.W.1, price 3s. 10d. post free.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE continued vigour of the Ex-British Westinghouse Association was again demonstrated at a luncheon held at the Holborn Restaurant, London, on May 3rd. It is the "coming of age" year of the Association and but for the war the usual dinner would have been held with suitable celebrations. In view of this the committee decided that a luncheon meeting should be arranged and encouraging support to the extent of 80 members was the result. **Mr. A. Winterbottom,** this year's chairman of the Committee, presided, and though the proceedings were quite informal a most enjoyable reunion took place.

Past chairmen present were Messrs. H. S. Aspinall, W. W. Hughes, A. G. Seaman, M. M. Gillespie, L. S. Morshead, and the "long-distance attendant," Mr. C. Hart, who made the journey from Glasgow. The toast of the chairman was proposed by Mr. J. H. Tearle, and Mr. Winterbottom, in reply, cracked the old joke that as the Association could not by its constitution add to its members it was essentially a dying society, but the large and healthy gathering suggested that it would still be a long day before the last two remaining members would sit at meat together. A vote of thanks was given to the Committee, Mr. L. S. Richardson, hon. secretary, and Mr. L. S. Hawes, hon. treasurer.



Mr. A. P. Young, manager of the Rugby Works of the B.T.H. Co., who has been appointed a Director of Labour Supply (See page 593)

Mr. R. Daw, deputy borough electrical engineer at Dartford, has been appointed borough electrical engineer at a salary of £750, rising to £900. Mr. Daw served as pupil with the Dartford electricity undertaking, and during the last war was station engineer. He has been deputy for the past nine years.

Mr. Harry Moss, the well-known Bradford electrical contractor, has decided to retire from the contracting business and has disposed of his business to Messrs. Smith and Croft. Mr. Moss has been a member of the Electrical Contractors' Association for twenty-eight years and has served it in a number of capacities, having been a member of the Council for ten years. He has been on the Council of the Bradford Engineering Society for over twenty years and has just completed two years as president. For a considerable time he acted as hon. secretary of the Bradford E.D.A. Circle. Mr. Moss tells us that he hopes to be able to take up some work of national importance when he has settled his private business affairs.

Mr. J. Davidson has been appointed a director and chairman of the West Gloucestershire Power Co., Ltd.

Mr. L. F. Hiles has been appointed a director of Burco, Ltd.

Captain H. E. B. Daniell, agent for the Stella Coal Co., Ltd., has been elected president of the North of England Branch of the Association of Mining Electrical Engineers.

Mr. T. S. G. Seaward is the new chairman of the Tees-side Sub-Centre of the I.E.E. for the session 1940-41.

Mr. W. A. A. Burgess, has been elected chairman of the North-Eastern Centre of the I.E.E. for the 1940-41 session.

Mr. L. G. Reid, general manager of the Brush Electrical Engineering Co., Ltd., has been appointed to the board of Brush Coachwork, Ltd.

In our issue of May 10th we reported that **Major Frank Springate,** deputy electrical engineer at Tonbridge (Kent) had been appointed electrical engineer in succession to **Mr. J. C. Ellis,** conditional upon his release from service with the Royal Engineers and taking up his duties within six weeks from April 22nd. We now have pleasure in reproducing a recent photograph of Major Springate.

Major F. Springate

Mr. R. A. D. Macalister, who has retired from the position of mains superintendent with Greenock Corporation Electricity Department, has been presented with a wireless set by members of the Department. Mr. D. McDougall, chief engineer and manager, made the presentation.

Henley's evacuated staff at Dorking continue to make good use of their leisure hours, despite the difficulties encountered in "exile," and on May 22nd and 23rd they staged their fourth annual art exhibition. As was to be expected, many of the artists and photographers concentrated their efforts on scenes at Milton Court, and excellent results were achieved. Sir Montague Hughman's special prizes were won by Mr. J. Dunford Smith for a water-colour "The Old Way, Westerham"; and Miss I. Hall for an embroidered tablecloth in the ladies' section. Altogether about 120 exhibits were on view, ranging from oil paintings to knitted gloves, and in presenting prizes at the conclusion of the show Mrs. P. Dunsheath congratulated the competitors on their work.

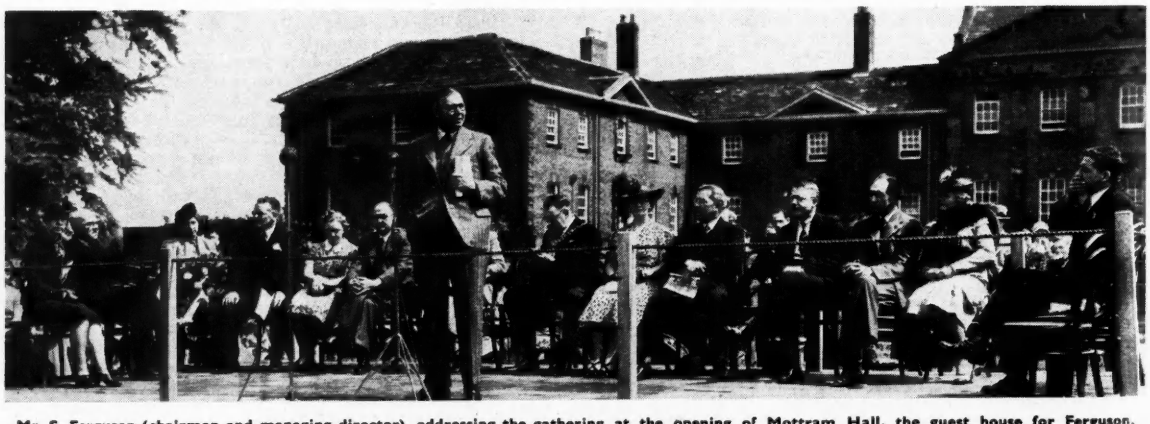
Mr. H. Joseph, managing director of the Midland Electric Installation Co., Ltd., has been presented by the staff with a silver cigarette casket to mark the firm's coming-of-age.

A gift of silver plate was recently presented by the employees of the English Electric Co.'s Rugby works to **Mr. G. H. Nelson,** chairman and managing director, to mark the tenth year of his chairmanship and the twenty-first anniversary of the company.

Mr. G. E. J. Day, who has retired from the position of mains superintendent with the Hammersmith Borough Council electricity undertaking, was presented on May 4th with a pair of field glasses and a silver cigarette case by members of the staff of the Electricity Department. Mr. J. R. Jones, the borough electrical engineer, made the presentation. On the previous evening Mr. Day was the guest of honour at a theatre and supper party.

At a meeting of the Institution of Civil Engineers on May 28th, the James Alfred Ewing Medal and the Sir Charles Parsons Memorial Medal for 1939 were to be presented. The recipient of the Ewing Medal is **Prof. G. I. Taylor,** Fellow and Yarrow Research Professor of the Royal Society and Fellow of Trinity College, Cambridge, who is distinguished for his development of various aspects of mathematical physics, many of which have found applications of great importance in the engineering field. He was awarded the Royal Medal of the Society in 1933. The Sir Charles Parsons Memorial has been awarded to **Mr. H. L. Guy,** D.Sc., F.R.S., M.Inst.C.E., whose lecture dealt with "Some Researches on Steam Turbine Nozzle Efficiency." Dr. Guy has been the chief engineer, Mechanical Department, of the Metropolitan-Vickers Electrical Co., Ltd., since 1919. He is a Whitworth Exhibitioner, Bayliss Prize-winner and Thomas Hawksley Medallist, and is a vice-president of the Institution of Mechanical Engineers.

Mr. W. Winlow, an official in the electrical department of Murton Colliery for fourteen years, has left to take up an appointment with the Government. He has been presented with a gold watch by the colliery officials.



Mr. S. Ferguson (chairman and managing director), addressing the gathering at the opening of Mottram Hall, the guest house for Ferguson, Pailin employees (Elec. Rev., May 24th, p. 572)

Obituary

Mr. G. H. Wiggins.—We much regret to learn of the death of Mr. George Herbert Wiggins, senior surviving partner of F. Wiggins & Sons, who died suddenly on May 21st at his residence at Leatherhead, Surrey. He was in his eighty-fourth year.

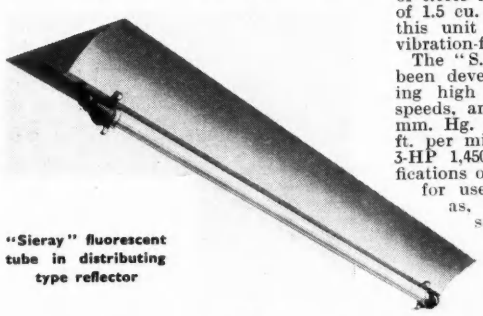
Will.—Professor D. Burns, of Cleughearn, Carluke, one of the founders and a director of Anderson, Boyes & Co., Ltd., mining and electrical engineers, Motherwell, left personal estate of £80,355.

NEW ELECTRICAL PRODUCTS

A Review of Equipment Recently Marketed

Fluorescent Tube Reflectors

SPECIAL reflectors for use with the new 80-W "Sieray" fluorescent tubes brought out recently are now available from SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames



"Sieray" fluorescent tube in distributing type reflector

Street, E.C.4, in both distributing and dispersive types for close ceiling, chain and rod-suspension mounting. They are constructed of heavy gauge sheet metal, and finished in stoved white semi-glossy enamel on the reflecting surface and white and bronze outside. Special designs can also be supplied.

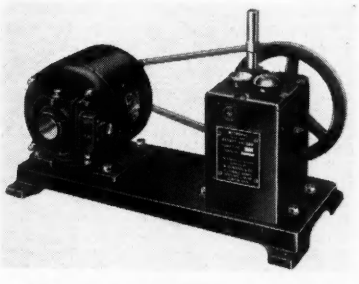
Compressed Air Couplings

The new "Instantair" coupling made by B.E.N. PATENTS, LTD., Hughenden Avenue, High Wycombe, are of particular interest in days when every minute saved is a contribution to speeding-up production. Wherever different air-operated devices have to be connected to various points on an air line they will save time, labour and expense.

Essentially, the coupling consists of a plug and a socket, the latter incorporating an automatic non-return valve. While the coupling is disconnected this valve remains closed, but as soon as the plug portion is connected to its socket member by a quick-acting bayonet connection, a slight turn of the wrist instantly locks the coupling and simultaneously opens the air valve. The removal of the plug automatically closes the valve. The couplings are positive in action and robust in construction.

High-vacuum Pumps

In view of their increasing use, both in industry and research, three new high-vacuum pumps made by W. EDWARDS & CO. (LONDON), LTD., Allendale Works, Southwell Road, Loughborough Junction, London, S.E.5, are of especial interest, particularly in view of the fact that a large proportion of such plants came



"Metrovac" type "S.R.2" vacuum pump

from Germany before the war. This "Metrovac" series of rotary pumps comprises both single- and two-stage models, covering a wide range of pumping speeds at low pressure. All the units operate on the slotted-rotor and sliding-vane principle and are of the oil-sealed type.

The single stage "S.R.2" pump is of very simple construction and has the minimum number of working parts. The inlet is normally screwed and fitted with an adaptor for rubber tube connection, but a union for metal pipe connection is available as an alternative. A vacuum of 0.005 mm. Hg. is obtainable with a displacement of 0.33 cu. ft. per minute. Operating at 350 RPM, the pump is belt driven by a ⅓-HP 1,425-RPM motor.

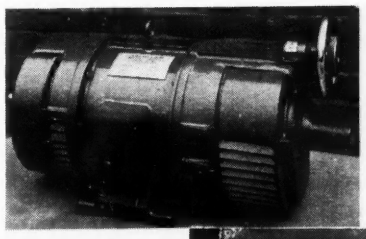
Direct coupling to the ¼-HP 1,425-RPM motor is provided on the "D.R. 1" pump, which has a helical-geared drive within. This model gives a vacuum of 0.0005 mm. Hg., with a displacement of 1.5 cu. ft. per minute. A feature of this unit is its particularly quiet and vibration-free operation.

The "S.R. 4/40" single-stage unit has been developed for applications requiring high vacuum and rapid pumping speeds, and it gives a vacuum of 0.007 mm. Hg. with a displacement of 40 cu. ft. per minute. It is belt driven by a 3-HP 1,450-RPM motor. Various modifications of this pump render it suitable for use under abnormal conditions, as, for example, where condensable vapours are present, in which case the performance may be improved by heating the pump. Similarly, a continuous supply of fresh oil may be arranged to prevent contamination and the pump may also be arranged for backing another pump where high speed is required at very low pressures.

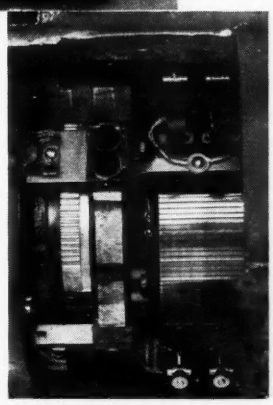
For certain applications of high vacua, various plants are supplied consisting of rotary and diffusion pumps mounted together on a common base with motor and all necessary accessories.

Variable-Speed AC Commutator Motors

The use of AC commutator motors for drives where speed variation is required without loss of economy or efficiency is now so general that the basic characteristics are well known. The new type "CH" motors, made by J. H. HOLMES & Co., LTD., Hebburn-on-Tyne, however, present a number of features



Holmes type "CH" commutator motor showing (right) the sliding contacts and the rigid brushgear construction



worthy of particular notice. One of the most important is that the commutator brushgear is mounted complete on the housing of the cartridge bearing, so that on dismantling it comes away with the rotor and remains undisturbed in its relation to the commutator.

Sliding copper contacts replace the flexible trailing cables ordinarily provided for conveying current from the commutator brushes to the stator winding, and thus all possibility of trouble due to chafing of the cable insulation is eliminated. There is no external regulator of any kind, and therefore the only cables necessary are the mains from the starter.

Rigid cast-brass brush arms are fitted, and the facings on them to which the brush-holders are bolted are serrated. The engaging faces of the brush-holders are similarly serrated, and in this way complete rigidity is ensured. A large handwheel driving through gearing is provided for moving the brushgear, and a locking device prevents inadvertent alteration of speed.

Large hinged doors at each end afford easy and ample access to the commutator, the slip-rings and the brushgear for inspection and maintenance. The ventilating apertures in the doors are so arranged as to provide a drip-proof enclosure. To enable the drive to be taken from either end, all standard motors are supplied with their shafts extended at both ends, and the non-driving end is protected by a metal cover fixed to the end-bracket.

Road Obstruction Lanterns

The use of electric obstruction lanterns for fixing to street bollards or other supports not only reduces the cost by from 2d. to 6d. per lamp per day (in one London borough this has been estimated at nearly £5,000 a year), but also saves oil and man power.

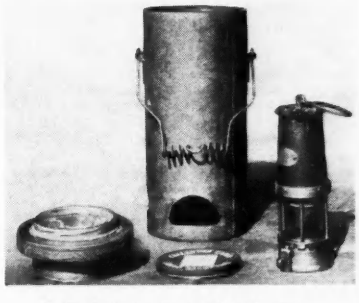
G.E.C. road obstruction lantern mounted on a bollard

The GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, has developed a road obstruction lantern which complies strictly with the Lighting (Restrictions) Order, 1940. It is constructed of lead-coated sheet steel and has three sides stencilled with the approved cross sign and backed with white opal glass. Inside are a detachable baffle and a b.c. lampholder for use with a 15-W pearl lamp, which provides the correct amount of light on the crosses. The lamp is easily accessible for wiring and maintenance. The lantern can be supplied finished in either black or white outside. A two-lamp unit ensuring that there is a light even if one lamp fails is available if required.

Emergency Jointing Apparatus

An instance of the consideration being given to cable repairs in emergencies is the introduction by CALLENDER'S CABLE & CONSTRUCTION CO., LTD., Hamilton House, Victoria Embankment, E.C.4, of special apparatus for warming "Kaleoilris" tape for jointing. This comprises a miner's lamp fitted into a metal case or oven, which burns mineral colza oil, and is designed to warm "Kaleoilris" tape even when coal gas may be present during repair work.

The metal case has a slip-on lid into which is fixed a Callender's "Scru-vac" lid tape tin. The lamp can be sealed in the manner of an electricity company's cut-out or by a padlock, and may be lighted in the stores before proceeding to the job. There is no danger of the tape being overheated, and the usual rules apply in charging, &c.



Callender's emergency jointing lamp

NEW BOOKS

Aircraft Equipment. Electrical Engineering Textbook. American Wiring Manual

Electrical and Wireless Equipment in Aircraft. By S. G. WYBROW. Pp. 181; figs. 121. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, W.C.2. Price 5s.

This is the fourth edition of a book which forms one of a series of nine textbooks for ground engineers and is recognised by the Air Ministry as a textbook for intending applicants for ground engineers' licences. The first twenty pages give a summary of the principles of electricity and magnetism, the next hundred are devoted to the basic principles of the design of aircraft electrical equipment with notes on its care and maintenance, the localisation of faults and repairs, and the remainder to wireless equipment including descriptions of a number of specific sets of apparatus.—C.G.C.

Electricity in Aircraft. By W. E. CROOK, Pp. 100; figs. 127. Sir Isaac Pitman & Sons, Ltd. Price 5s.

This book is written for those studying for the Air Ministry "X" licence in respect of electrical equipment, and is strictly confined to the end in view. Hitherto there has been no one manual covering exclusively the theoretical knowledge required, and students have had to refer to publications which covered wider ground. Even so, the student will require, in addition, rather more extensive information on electrical principles than there is room for in this volume. Practical experience is, of course, also required for the "X" licence. The subjects covered are batteries, generators, engine starting, wiring, miscellaneous equipment, magnetos, starters, timing devices and sparking plugs. The text is concise and clear, and the diagrams are good.—C.G.C.

Metallurgical and Industrial Radiology. By K. S. Low. Pp. 88; figs. 42. Sir Isaac Pitman & Sons, Price 7s. 6d.

The author's intention is evidently to promote a fuller realisation of the steadily increasing value that is being attached to X-rays as a means of examining engineering products and component parts. The method is not only an insurance against hidden imperfections that could not otherwise be revealed without destroying the specimen, but may also aid prediction of subsequent behaviour.

The subject is, however, so large that for a little book like this one the author has had to limit himself to a few only of the very many possible applications. But the general principles outlined do serve to indicate the resources now becoming available. He has not overlooked the very material difference there is between "radiography," which merely means X-ray photography, and the art of interpreting that which "radiology" is capable of revealing.—W. O. F.

The Calculation and Design of Electrical Apparatus. Second edition. By W. WILSON, D.Sc., M.I.E.E. Pp. 230; figs. 24. Chapman & Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 10s. 6d.

In electrical literature this book has a two-fold value—first, on account of the comparative rarity of books on this subject; secondly, because of the author's practical association with the matter of which he treats.

We should regard the book as far more useful to engineers than to students, and for this reason we think it could be further pruned by removing parts of a textbook character. True, the author rightly attempts to base his discussions on scientific principles, but the design of most apparatus must necessarily make use of empirical data.

Liquid resistors, switch contacts, rheostats, magnets, choking coils and similar appliances involve the use of practical rather than scientific data in their calculation. On the other hand, units and theory, logarithmic tables and the like, can easily be obtained elsewhere. The reader would be better served by a fuller discussion of the useful and numerous worked examples.

The tables given on the whole are helpful, but at times the units are awkward or the data leaves one in doubt. For example, energy to heat water is calculated in HP/min. and the reader is told that 3HP/min. to raise the temperature of a pint of water by 56 deg. C (or 100 deg. F) is easily remembered, or alternatively 4kW/sec. to raise one cu. in. through 58 deg. C. Again, on the same page the resistivity of water is given as 4,270 ohms and 1,960 ohms per inch cube, without explanation.

Dr. Wilson has given us a very useful book, but his colleagues will be still more grateful to him if he pays greater attention to simplicity in units and general clarification.—S. P. S.

Electrical Engineering Science: A Second-year Course. By Arthur Morley and Edward Hughes. Pp. 256; figs. 152. London: Longmans, Green & Co., Ltd., 39, Paternoster Row, E.C.4. Price 5s.

This excellent little book has been written with the object of covering the syllabus in electrical science in the second-year National Certificate course, the authors having already published a volume covering the first-year course. They recognise that the subject of alternating currents is becoming of increasing importance to the electrical engineer, hence instead of leaving the study of AC until the third-year course they have brought forward a considerable amount of it into the volume under review.

In so doing, they have not lost sight of the fact that as usually presented AC theory involves an advanced knowledge of mathematics, including the calculus, such as the second-year student can hardly be expected to have obtained. They have, therefore, sought to explain the various elementary facts governing AC theory by the use of curves and graphical construction. In this way, using only simple algebra and trigonometry together with elementary co-ordinate geometry and simple vector arithmetic, they have covered the elementary theory of AC generators and transformers in addition to resistance, induction, capacitance and power in AC circuits.

For the rest, the book covers the usual subjects associated with the second-year syllabus of the three-year technical college course, the whole being presented in a commendably straightforward manner. Wherever possible, simple experiments are described and another valuable feature is the short summary given at the end of each chapter. A number of examples have been worked out in the text and questions are set at the end of each chapter, the answers also being given.—A. R.

Practical Electrical Wiring. By H. P. RICHTER. Pp. 503; figs. 457. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, W.C.2. Price 20s.

This American book is intended not only for the beginner, but for those already engaged in electrical work. Its appeal to British students and apprentices is limited by its references to the National Electrical Code, since that code differs on so many points from our own Wiring Rules. They would, too, find confusing its frequently different terminology: e.g., "three-way" for our "two-way" switch, "socket" for our "lampholder," and "receptacle" for our "socket"—to say nothing of "hot wire" for the live conductor. On the other hand, its elementary chapters aside, the book contains much which will interest, and be useful to, contractors and supervisors.

The book is in three parts. The first deals in the usual way with elementary electrical theory, goes on to describe basic circuits, accessories and wiring material, and concludes with a survey of the general principles of various wiring systems. Chapter 14 on "Lighting" is particularly good. The second part—and this is where our readers are more likely to find something of value—gives in detail methods of meeting the practical problems encountered in the wiring of houses and flats. There is a special chapter on farm wiring, in which the author is an expert. This section serves as a basis for the more elaborate treatment in the third part of larger installations, such as in factories, stores, schools, churches and so on.—H. R. T.

The Measurement of Alternating Current Energy. By DONALD T. CANFIELD. Pp. 210; figs. 74. McGraw-Hill Publishing Co. Price 12s.

Prof. Canfield's new book for those called "metermen" in America is an attempt to present a clear and detailed explanation of the action and applications of the induction AC meter. After an interesting historical introduction, the production of driving and braking torques to give proportionality of speed to power is dealt with at considerable length. Two chapters are devoted to the details of meter design and to the arithmetic of gear trains. The causes of, and the compensation for, meter errors are fully explained, and the chapter on polyphase metering includes reactive as well as energy measurements. The concluding chapters deal with the checking of metering schemes by the use of vector algebra and with metering problems arising from special connections of polyphase supply transformers.

The scope of the book, in spite of the apparent comprehensiveness of its title, is really rather restricted. The subjects of meter testing and of the checking of meter connections after erection, for instance, find no place in the book, nor is there any but historical reference to the measurement of maximum energy or kVA demand. Errors caused by wave distortion are becoming of increasing practical importance and deserve more than the very scanty reference they receive. The checking of polyphase metering arrangements by algebra involving the use of the imaginary "j" will seem to many to be rather academic in a book intended for practical men.—G. W. S.

Shorter Notices

"Elements of Automobile Engineering." By Maurice Platt. Pp. 192; figs. 100. Sir Isaac Pitman & Son, Ltd. Price 5s.—The idea of this book is to bridge the gap between the simple "How it Works" manual and the more advanced textbooks of automobile design. At the same time an endeavour has been made to provide the student with a fair account of the principles upon which motor-car design is actually based.

"Photo-electric and Selenium Cells." By T. J. Fielding. Second edition. Pp. 163; figs. 82. Chapman & Hall, Ltd. Price 7s. 6d.

"Definitions and Formulæ for Students: Radio and Television Engineering." By A. T. Starr. Third edition. Pp. 49; figs. 33. Sir Isaac Pitman & Sons, Ltd. Price 6d.—This little book has reached its third edition in five years. The first half is devoted to definitions, arranged alphabetically and based on the B.S.S. glossary. Most of the second half is taken up with explanatory accounts of the more useful circuits and their relevant formulæ, the last six pages containing television definitions.

"Mathematical Methods in Engineering." By Theodore v. Kármán and Maurice A. Boit. Pp. 505; figs. McGraw-Hill Publishing Co., Ltd. Price 26s.

"Writing the Technical Report." By J. Raleigh Nelson. Pp. 373. McGraw-Hill Publishing Co., Ltd. Price 16s. 6d.—The author aims at inspiring in students and practitioners in various technical fields a keener and more intelligent interest in report writing and to give them a better understanding of their own mental processes and of the practical procedures involved in the preparation of a report.

"Drake's Cyclopedia of Radio and Electronics." By H. P. Manly and L. O. Gorder. (Ninth edition.) Technical Press, Ltd., 5, Ave Maria Lane, E.C.4. Price 30s.

COMMERCIAL and INDUSTRIAL NEWS

Reserved Occupations. Mobilisation of Labour. Training the Unskilled.

Lighting Fittings Export Group

AN Electric Light Fittings Export Group has been set up for the purpose of material control and co-ordinating individual effort to increase export business in electric light fittings, in furtherance of the national export drive. The chairman of the group is Mr. A. E. Iliffe and Mr. Felix A. Rogers is the secretary. Membership of the group is open to manufacturers in Great Britain of electric light fittings and fittings accessories who at present are exporting their products or intend doing so. Such manufacturers are invited to communicate with the secretary, 36, Kingsway, London, W.C.2, by June 4th.

Reserved Occupations

In our last issue we gave a list of electricity supply workers who are included in the Schedule of Reserved Occupations. We have now received from Mr. A. H. Banks, employers' industrial adviser to the National Joint Industrial Council for the Electricity Supply Industry, a complete list of reserved occupation ages issued by the National Service Committee of the National Joint Board and the National Joint Industrial Council.

The occupations which are peculiar to the electricity supply industry are as follows (ages given in parenthesis):—Boiler house superintendent or combustion engineer or steam engineer; control engineer or relay engineer; district engineer and assistant; distribution engineer and assistant; engineer, junior; generation engineer and assistant; installation inspector; mains development engineer and assistant; mains foreman; mains superintendent and assistant; meter and testing superintendent and assistant; meter inspector; meter tester; meters, chief electrical officer; power station superintendent and assistant; resident engineer and assistant; shift charge engineer; substation charge engineer; substation attendant and assistant; substation superintendent and assistant; substation inspector and assistant; switchboard attendant, supervisor or control room attendant; switchboard attendant, assistant and technical assistant (all 25).

Auxiliary plant attendant; boiler cleaner, scaler; consumers' engineer; domestic appliance maintenance superintendent; meter fixer (all 30).

Those grades employed by the electricity supply industry in common with other industries are as follows:—Domestic appliance repairer; driver (generation) and assistant; fitter (electrical); fitter (mechanical); meter repairer (mechanician); pump attendant (stationary engine driver) (all 23). Constructional engineer; conveyor (coal) attendant; crane driver; electrician (telephone); electrician or wireman; jointer (plumber); jointer (not plumber); linesman (overhead power); locomotive driver; maintenance engineer (electrical) and maintenance engineer (mechanical), including assistant if a qualified engineer; shunter; stoker; storekeeper; telpher driver (all 25). Oiler, greaser and cleaner; transport manager (30).

Allocation of Labour

To ensure the best and fullest use of the labour power of the country the Minister of Labour and National Service (Mr. Ernest Bevin) has established under his own chairmanship a Labour Supply Board consisting of the following four Directors of Labour Supply:—Major-Gen. K. C. Appleyard (chairman of the North Eastern Trading Estates), Mr. R. Coppock (National Federation of Building Trades Operatives), Mr. J. C. Little (former president of the Amalgamated Engineering Union) and Mr. A. P. Young (manager, Rugby Works, British Thomson-Houston Co., Ltd.).

The Board will function through a provincial organisation, the framework of which will be the employment exchange service and the Divisional Controllers who direct the service will be the chairmen of the area boards set up by the Ministry of Supply and now transferred to the Ministry of Labour. Labour Supply Committees will be appointed in the principal areas with local industrial panels to assist them. To ensure that skilled labour is being used to the best advantage Inspectors of Labour Supply will work in conjunction with the area boards and local committees; they will also be responsible for seeing that adquate training facilities are available.

Under the Emergency Powers (Defence) Act, National Service Officers will be appointed who will have power to require persons where necessary to undertake work of national importance. To facilitate the movement of labour the Minister is to institute a system of allowances for married men who are transferred from their home areas.

Training Unskilled Labour

The Minister of Labour has called for volunteers for service in munition factories and for the purpose of training them is expanding the training centres already established and shortening and intensifying the courses. The call is to unemployed men as well as those who are not in reserved occupations. Men who wish to volunteer are asked to apply at the nearest employment exchange; they will be required to serve in any part of the country and travelling and family allowances will be paid. Training is provided in the following trades: Draughtsmanship, instrument making, panel beating and sheet metal working, electric and oxy-acetylene welding, gas and hot-water fitting, and coach body building.

All-electric Bandstand

A new bandstand electrically equipped throughout just completed at Victoria Park, London, E., is likely to become the model for many similar buildings when the war is over. Though, of course, not usable at night-time at present, a complete stage lighting installation has been provided, apparatus supplied by Davis Bros. being employed. The footlights comprise five banks of nine 60-W lamps, while four strips of twenty-seven lamps form cove lighting in the specially shaded ceiling.

All-electric bandstand at Victoria Park, E.

An electrically operated curtain (Hall) has three controls, one at each side of the stage and the other in the curtain room. Four microphones are connected to a Film Industries sound amplifier, serving loud speakers not only in front of the stage but also on the roof of the café at the rear. Wandsworth watertight switch-plugs are used on the stage. Hot water for the dressing-room at each side is provided by two Heatrae 1½-kW, 15-gal. self-contained water heaters, with M.K. switches.

Eight Ferranti parabolic reflector fires warm the café, the lighting coming from attractive pendant fittings made by the General Electric Co., Ltd., which also supplied two special inset units over the counter to the design of the London County Council Parks Committee. Provision has been made for fitting further loud speakers in the café itself if required. The equipment of the kitchen and the service counter includes a 6-kW "Magnet" cooker and also a smaller separate oven and hotplate unit; a 3-kW Heatrae water heater; an 8-kW Jackson boiler for hot water, milk and coffee; and a Frigidaire refrigerator. The lighting fittings in the kitchen and dressing-rooms were supplied by Dorman & Smith, Wardle Engineering Co., and Benjamin Electric.

Although the supply from the Hackney Corporation is 240 V DC the load has been split up in readiness for the time when the change-over to AC is carried out. A small DC to AC rotary convertor (Collins) operates the sound equipment. Sanders "Superior" ironclad switch and fuse gear has been employed and the cables are Hackbridge. The electrical installation has been carried out by Evans & Shea, Ltd., to a specification drawn up by the L.C.C. Chief Engineer's Department. The work was personally supervised by Mr. J. F. A. Evans.

Mobile X-Ray Theatres

Lister air-cooled petrol-electric generating plant, equipped with a special voltage compensating system, is being used by the Army Medical Department in its latest X-ray ambulances. These ambulances, which are completely self-contained, are equipped for the taking of X-ray photographs of any part of the body, and include a dark room for the developing of the films.

The Philips Concerns

We are informed that the registered office of the Dutch Philips Companies of Eindhoven, Holland, has now been transferred to Curaçao, Dutch West Indies.

A National Savings Week

The National Savings Committee is organising a National Savings Week from June 9th to June 15th. The object is not so much to raise a large sum of new money during the week but to increase the number of savings groups. Of these there are already over 80,000. By June 15th it is hoped to achieve at least 100,000. Closely allied to this main object is the desire to increase the membership of existing groups and to increase the amounts of the weekly subscriptions of members. Of the savings groups formed since last November 75 per cent. are in places of employment. Employers who have not yet formed groups or given facilities for their formation should get into touch with the National Savings Committee, Sanctuary Buildings, Great Smith Street, London, S.W.1.

Old Cromptonians Dinner Postponed

The dinner of the Association of "Old Cromptonians," which was to have been held at the Savoy Hotel this evening (Friday), has been postponed in view of the present situation and on account of the renewed calls upon the time of those engaged upon work of national importance.

I.C. Engine Export Group

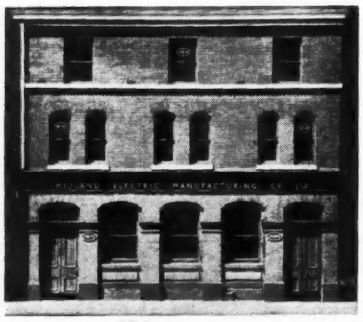
In our issue of March 29th we announced the formation of the Internal Combustion Engine War Export Group by the Internal Combustion Engine Manufacturers' Association.

We have now received a copy of a supplement to the scheme.

This describes the detailed procedure now being brought into operation under the scheme to secure for the members of the Group a continuous supply of the controlled materials which are essentially necessary for the maintenance and development of their export trade and to ensure that controlled materials which are supplied for that purpose are used exclusively for it. The procedure elaborated in the present supplement has formed, for some considerable time past, the subject of close discussion between the Executive Committee of the Group and the Board of Trade, the Export Council, the Ministry of Supply Controls and the Department of Overseas Trade who have given it, in the form in which it appears in the supplement, their cordial official approval. As pointed out by the Executive Committee in the preface, the procedure as formulated in the supplement is a pioneer effort and experience of its practical working may possibly show that some modification in minor details may be required. With the good will and co-operation of the industry, however, the procedure, it is considered, forms basically a practicable and efficient plan to achieve the important end which the Executive Committee and the Export Council have in view.

Collapsible Crates

For assisting in the conservation of timber supplies the Midland Electric Manufacturing Co., Ltd., recently began using collapsible and returnable packing crates of a new type developed by M.E.M. and built up from loose sides, ends, bottom and lid. These parts are held together while the goods are packed, the lid is then placed in position and the whole bound together with steel wires. Opening the crate is quite simple. Two coppered wires running round top and bottom are cut, allowing



The new branch premises which were recently opened by the Midland Electrical Manufacturing Co., Ltd., in Manchester

the lid to be removed and the contents taken out. When the crate is empty two other wires around the sides are cut, allowing the crate to collapse ready for bundling.

No change has been made in M.E.M.'s scheme of free packing arrangements and no charge for the crate is raised on the invoice. The co-operation of customers is relied on to secure the return of the crate, and in order to familiarise them with the arrangement and to stress its simplicity a special leaflet has been printed and distributed. A copy of this leaflet will be affixed to each crate until storekeepers, &c., are conversant with the method of unpacking. In the three months during which the crates have been in use a very high proportion has been returned without the need for any special follow-up arrangements.

Registered Electrical Contractors

Applications from the following for registration were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its meeting on May 3rd:—L. R. Alcock, 10, Wakefield Road, Oakhill, Stoke-on-Trent, and F. L. Moore, 40, Silver Street, Doncaster. At the same meeting one application was withdrawn and three were declined.

High Strength Aluminium Alloys

Although the end of the war may seem a long way off it is perhaps not too soon to consider the position when certain materials now required for armament purposes are available once more for general manufacturing. In particular high-strength aluminium alloy extruded sections now employed so largely in aircraft production are likely to have a big future in the electrical field for situations where lightness, combined with strength, is essential. By extrusion it is possible to produce practically any desired shape or size of section and at the same time secure that the mass of metal is where required.

Actual applications to which the alloys can be put must be a matter for individual manufacturers to decide. It is probable that draughtsmen at present engaged in aircraft work will learn their advantages and will, after the war, take back into industry ideas for their appropriate use, but in the meantime Mr. R. Worsdale, sales manager of the Reynolds Tube Co. Ltd., has expressed his willingness to make suggestions as to possible applications. His company, incidentally, has laid out at its Hay Hall works, Tyseley, Birmingham, a plant for the extrusion of particularly difficult and intricate sections.

Trade Announcements

Mr. A. R. St. Clair informs us that owing to the war his position with Zeiss Ikon, Ltd., as manager of its lighting department for the United Kingdom, has terminated, and he has now started in business on his own account, having formed a limited company, Silux, Ltd., for the purpose of producing and marketing facsimile designs of the commercial lighting fittings and reflectors previously supplied through Zeiss Ikon, Ltd.

Thomson & Brown Brothers, Ltd., are removing on June 3rd to 51-55, Waterloo Street, Glasgow (telephone: City 4981).

Employment in April

In the engineering industry as a whole the numbers unemployed at April 15th showed a further slight decrease as compared with the previous month, and in electrical engineering there was little change. According to the *Ministry of Labour Gazette* the number of unemployed in the engineering industry at April 15th decreased by nearly 3,000 as compared with March 11th, 1940, and by approximately 40,000 as compared with April 17th, 1939.

In electrical engineering the number out of work was 2,254, or 1.8 per cent., a decrease of 0.2 per cent. as compared with March, and 2.9 per cent. as compared with April, 1939. The unemployed in the electrical wiring and contracting industry numbered 2,396, the percentage falling from 6.6 to 5.6 (10.4 per cent. in April, 1939). In the electric cable, apparatus, lamps, &c., group the unemployed totalled 6,910, or 3.7 per cent., as compared with 4.1 per cent. in March and 7.4 per cent. in April, 1939.

E.P.E.A. Members on Service

The General Purposes Committee of the Electrical Power Engineers' Association recommends that the subscriptions of members called up for service in H.M. Forces who are not receiving civilian pay shall be 50 per cent. of the amount normally payable. Alternatively, such members can elect to suspend their membership during their period of service, in which case their subscription on resuming membership will be *pro rata* for the year in which they resume.

South African Municipal Year Book

We have received the 1939-40 edition of the Official South African Municipal Year Book, edited by Mr. W. P. M. Henderson, former Town Clerk of Durban, and Captain F. G. Pay of Cape Town. With the growth of engineering and electrical enterprise in South Africa, the particulars in these sections are very much more extensive than those published previously, and will be of considerable use to engineers and others. Data relative to municipalities and local bodies has been brought up to date, and the comparative statistics relating to finance, population, tramway undertakings, water supply, electricity supply, engineering and motor transport have been revised and dealt with in such a manner as to form a comprehensive reference to the whole of South Africa. The book is published at 25s., and may be purchased from the publishers, P.O. Box 1136, Cape Town, or from the London Agents, E. G. Allen & Son, Ltd., 12, Grape Street, Shaftesbury Avenue, London, W.C.2.

Air Conditioning and Health

The remarkable effect of air conditioning in the prevention of illness is demonstrated by statistics given to us by the manager of an air-conditioned showroom belonging to one of the London electricity supply undertakings. For the year ended May 31st, 1939, members of his staff were absent from work on account of illness on an average of only 1.2 days. On the other hand, at five other of the undertaking's showrooms not equipped with air conditioning the average absence ranged from 4.15 to 6.5 days.

Price Increase

The Airedale Electrical & Mfg. Co., Ltd., announces that as from June 1st the present price advance of 7½ and 5 per cent. will be increased to 20 per cent. (total). Orders based on valid outstanding quotations dated on and from the last price advance will be accepted at the quoted price, if they are received on or before June 14th.

Prices of Materials

Henry Gardner & Co., Ltd., report, May 29th: No change in the price of copper bars (best selected), sheet and rod, English pig lead, spelter and mercury. English block tin, £268, £2 10s. decrease.

Edward Till & Co., report, May 29th: India-rubber, Para fine, 1s. 3d., 1d. increase.

F. Smith & Co., report, May 29th: No change in the price of electrolytic copper bars, wire rods and h.c. wire.

Calendar

Oldham & Sons, Ltd., Denton, Manchester, have sent us a calendar for 1940-41 (commencing in June) with large monthly sheets each of which has a charming picture of the English countryside or coast. Reference is made to the various types of batteries produced by the company.

New Catalogues and Lists

Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, E.C.4.—Publications 1160 and 1077A dealing respectively with the "Ter Linden" cyclone dust collector and mechanical draught for boilers and furnaces.

T. Price & Son (Stampers), Ltd., Spring Hill Passage, Birmingham.—A leaflet describing the new "Prilect Junior" thermostatically controlled iron.

J. G. Statter & Co., Ltd., 82, Victoria Street, Westminster, S.W.1.—Publication 220 illustrating and describing industrial ironclad oil-immersed non-draw-out type circuit-breakers, in which minor improvements have recently been incorporated.

Gramophone Co., Ltd., Hayes, Middlesex.—The April-May issue of "The Voice" contains a supplement dealing with the new season's H.M.V. refrigerators.

Electric Construction Co., Ltd., Lamport Hall, Northampton.—Booklet B.1204 illustrating and describing E.C.C. metal rectifiers, including models for electric vehicles and car battery charging, cinema emergency lighting, miners' lamp charging; also oil immersed units for plating and electrolytic work. A series of diagrams shows the method of operation.

Sun Electrical Co., Ltd., 118-120, Charing Cross Road, W.C.2.—The 1940 season fan list.

Mallory Metallurgical Products, Ltd., 78, Hatton Garden, London, E.C.1.—Illustrated brochure concerning the properties of "Elkonite" alloys for facing contacts of circuit-breakers and relays to withstand heavy duty.

Multicore Solders, Ltd., Bush House, W.C.2.—An illustrated brochure describing the merits of Multicore solder. Useful data and tables on soldering are also included.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department, through the post. Inquiries must be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:

CHUMMY lamp.

ELECTRICITY SUPPLY

Calne Rebate. Fulham Power Station Extension and Building Acts

Amesbury.—HIGHER CHARGES.—The Amesbury Electric Light & General Supply Co., Ltd., announces that as from the meter readings for the midsummer quarter all charges (in the case of the two-part tariff, both fixed and "unit") will be advanced by 10 per cent.

Banbury.—OVERHEAD LINE EXTENSIONS.—Plans of the S.W. & S. Power Co. for low-voltage overhead extensions have been approved by the R.D.C.

Bradfield (Berks).—ELECTRIC PUMPING.—The Rural District Council proposes to electrify its pumping plant.

Calne.—REBATE TO CONSUMERS.—It was announced at the last meeting of the Town Council that, despite extra costs, the electricity undertaking had maintained its profits and that a rebate would be given to certain consumers next quarter. The report of Mr. H. W. Martin, the electrical engineer, showed that sales had increased by 42 per cent. and the number of consumers had risen from 709 to 900.

Chesterfield.—RECORD OUTPUT.—In his annual report to the Electricity Committee Mr. D. H. Davies stated that notwithstanding the black-out, earlier "summer time," &c., the output of 26.43 million kWh for the year ended March 31st, 1940, was a record for the undertaking. Exactly 50 per cent. of this was generated by steam at the local power station. The working cost of 0.73d. per kWh was practically the same as during the previous five years. All-round concessions in charges to consumers were adopted in July, 1939, which resulted in a reduction of 11 per cent. in the average price received, this being exactly 1d. per kWh. The net result of the year's working was a profit of £4,486, and no increases in charges are contemplated in spite of the fact that the price paid per ton for fuel will this year show an increase of about 20 per cent.

PROPOSED MODIFIED STREET LIGHTING.—A supplementary estimate of £1,220 has been approved by the Finance Committee for the provision of modified street lighting. Members of the Electricity Department recently visited Leicester and inspected the low-intensity street lighting there.

Croydon.—NEW OFFICES AND SHOWROOMS.—The Electricity Committee recommends that building works in connection with the new electricity offices and showrooms should be completed at a cost of £15,500.

LOAN FOR ACQUISITION OF ADDINGTON AREA.—Sanction has been obtained to borrow £203,122 for the purchase of the Addington area.

SUBSTATION PLANT.—Additional plant is to be provided at the Lower Coombe Street substation at a cost of £727.

Farnham.—PRICE INCREASE.—As from the June quarter meter readings the Farnham Gas & Electricity Co. is advancing the price of electricity by 10 per cent., except under the prepayment tariff, which will be increased by ½d. per kWh.

Guildford.—RURAL EXTENSIONS.—The Electricity Committee is to extend mains to Onslow Village, Burpham, Guildown and Peasmarsh, &c., at a cost of £5,216.

Ipswich.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains in the Felixstowe urban district at a cost of £2,000.

Kingston-upon-Thames.—PROPOSED NEW POWER STATION.—At its meeting this week the Town Council agreed in principle to the Central Electricity Board's scheme for the erection at Kingston of a new selected generating station, the first part of which, estimated to cost £1,480,000, is planned to be ready by the middle of 1944. The total cost of the completed station is put at £2,610,000.

London.—POPLAR.—The Electricity Committee is to improve the steam raising plant at Glaucus Street power station at a cost of £1,750.

A scheme has been approved for a new substation to be completed in time for the maximum load period next winter.

BATTERSEA.—The Electricity Committee is seeking sanction to borrow £18,150 for cookers.

HACKNEY.—Application is being made by the Electricity Committee for permission to borrow £10,000 for mains extensions.

FULHAM.—Under the London Building Acts (Amendment) Act, 1939, the majority of the provisions of the London Building Acts do not apply to power stations. The Act came into force on January 1st, 1940, but under Section 154 any building in progress on January 1st must be completed in accordance with the provisions of the London Building Acts, of 1930 and 1935 unless the County Council otherwise consents. The County Council has accordingly informed the borough electrical engineer that plans must be submitted for the power station extensions as the work was commenced before January, 1940.

Not only does this decision involve the payment by the Fulham Council of the district surveyor's fees, which will amount to some £2,000, but also occasions very considerable delay in the progress of the work while the approval of the County Council is being obtained. This delay is a matter of concern as the extensions are required by the Central Electricity Board to be completed by a prescribed date. In these circumstances the Fulham Electricity and Lighting Committee is of opinion that the County Council should be asked to exercise the powers which it possesses to exempt the Borough Council from compliance with the 1930 and 1935 Building Acts in respect of the extensions.

ST. PANCRAS.—To meet a substantial demand for electricity at a new building being erected in Brunswick Square for the Pharmaceutical Society it is proposed to install substation equipment on the premises. This will be used to distribute AC supplies to the neighbourhood generally. The estimated cost is £4,297.

Morley.—SUPPLY TO MILLS.—At the last meeting of the Council the borough electrical engineer (Mr. N. Hunter) reported that R. V. J. Horsfall, Ltd., of Albion Mills, had decided to change to Corporation supply. In order to give the supply it would be necessary to install an additional transformer which, with associated switchgear and cable, would cost about £1,300.

Penrith.—TOWN HALL INSTALLATION.—The U.D.C. is in negotiation with the Penrith Electric Supply Co., Ltd., regarding the installation of electric lighting and heating at the town hall.

Reading.—SUPPLY EXTENSION.—The Town Council proposes to make a supply of electricity available to new premises of the Imperial Tobacco Co. at Theale.

Rawtenstall.—ELECTRICITY CHARGES.—In last week's issue, page 574, it was incorrectly stated that the Electricity Committee has increased its charges by 5 per cent. We are informed that the only increase at the moment is a reduction of the discount for prompt payment from 5 to 2½ per cent.

Seisdon.—RURAL PRICE REDUCTION.—Consumers in the Codsall, Oaken and Wrottesley areas of the Seisdon rural district are to pay 20 per cent. less for their electricity. The reduction is the result of long negotiation between the Seisdon Rural District Council and the Wolverhampton Electricity Department regarding the original rate agreed upon between the two authorities.

South West Midlands.—DISSOLUTION OF JOINT COMMITTEE.—Having regard to the changed circumstances of the South West Midlands Electricity District, the South West Midlands Advisory Joint Committee, constituted under the South West Midlands Electricity District Order, 1923, represented to the Electricity Commissioners that no useful purpose would be served by the Committee's continued existence. The Commissioners are *prima facie* satisfied that it is expedient that the Committee should be dissolved and have published a draft Order to this end. A local inquiry with reference to the Order was held on Monday at Birmingham.

Tiverton.—SUPPLY TO FACTORY.—To provide an electricity supply to the lace factory of John Heathcoat & Co., a new cable is to be laid at a cost of £400, and transformer equipment provided costing £510.

Overseas

France.—POWER SCHEME.—A decree of the French Government has authorised the construction of a hydro-electric plant at Vieux Moulins, using a fall of approximately 107 metres at mean water level. Maximum gross power of the fall is estimated at 8,390 kW, corresponding to 5,320 kW of available power. Work is to be begun within a year.

Tasmania.—NEW GENERATING PLANT.—Two new generating units for the Hydro-electric Commission's Waddamana power station, for which a contract has been placed with the English Electric Co., Ltd., are to be driven by turbines of the horizontal impulse type rated at 16,700 HP at 500 RPM, the normal head being 1,070 ft. The *Electrical Engineer and Merchandiser* (Australia) states that with the new plant the total rated capacity of the station will be increased from 57,240 to 87,240 kVA. The Commission is also extending its Tarraleah power station by two 18,750-kVA units for which an order has been placed with the English Electric Co. These will bring the station capacity up to 93,750 kVA.

TRANSPORT

Leeds.—PROPOSED TRAMWAY EXTENSION.—A Ministry of Transport inquiry was recently held into an application by the City Council for an Order empowering the Council to extend its light railways. To serve part of the Seacroft estate, it is proposed to construct a tramway from Gipton Approach for a distance of 1½ miles alongside Wyke Beck Valley Road and along a reservation in South Parkway. It is also desired to lay a track between the dual carriageway of Belle Isle Road, a new road, and Middleton Park Road, joining the existing Middleton Park Road track after 1¾ miles. The Seacroft line would be deferred until after the war, but ¾ mile of the Belle Isle scheme, estimated to cost £21,653, is considered immediately necessary.

At the inquiry it was stated that the four points which had influenced the Council in adopting a system of reserved track tramways were the safety of the public; the motive power was derived from a home product, with the result that the city to-day had the benefit of a tramway service as intense as that operated last August; greater reliability in bad weather; and absence of obstruction of the highway.

Newcastle-on-Tyne.—PROPOSED NEW TROLLEY-BUS ROUTE.—Although the Ministry of Transport has made a Provisional Order authorising the City Council to change over the Elswick Road route from trams to trolley-buses, it may be a long time before the change actually takes place, owing to the war. The plan is to convert the Elswick Road route to trolley-buses and extend it for about a quarter of a mile beyond the existing terminus and run another route from the Big Lamp along Elswick Road, Buckingham Street, Heber Street to Gallowgate.

Summer Meeting

THE Western Centre of the Institution of Electrical Engineers is holding its summer meeting at Sedbury Park Hotel, Chepstow, on June 22nd. The annual meeting will be held at noon, followed by luncheon at 1 p.m. In the afternoon there will be a golf competition and other games, and a tea dance, the meeting terminating at 6.30 p.m. Further particulars can be obtained from J. B. Gwynne Lewis, hon. assistant secretary of the Centre, Principality Buildings, Queen Street, Cardiff.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1938

6042. "Turbo-alternators and other dynamo-electric machines." Brush Electrical Engineering Co., Ltd., and J. H. R. Nixon. February 27th, 1939. (520675.)

22463. "Electric relay systems for the step-by-step control of electric motors and other devices." Sangamo Weston, Ltd. (Weston Electrical Instrument Corporation). July 28th, 1938. (520678.)

23945. "Electro-magnetic motors with reciprocating movement." G. Naham. August 19th, 1937. (520680.)

25290. "Tariff recording equipment for telecommunication exchange systems." Standard Telephones and Cables, Ltd. (C. de Vriendt and L. Kpzma). August 29th, 1938. (520681.)

26382. "Sounding devices utilising electro-magnetic waves." Standard Telephones and Cables, Ltd. (Matériel Téléphonique Soc. Anon.). September 9th, 1938 (Convention date not granted). (520778.)

27287. "Method and apparatus for the electro-magnetic separation of materials." L. S. E. Ellis (United States Steel Corporation). September 19th, 1938 (Convention date not granted). (520626.)

27575. "Sound controlled lighting or alarm systems." H. Bright. September 21st, 1938. (520627.)

28298. "Closing mechanism for electric circuit breakers." A. Reyrolle and Co., Ltd., and J. Christie. September 29th, 1938. (520830.)

28371. "Electric forging machines." Omes, Ltd., and G. Mora. September 29th, 1938. (520688.)

28475. "Manufacture of vacuum electric incandescent lamps." General Electric Co., Ltd., R. E. Leeds and M. Pirani. September 30th, 1938. (520689.)

30782. "Means for securing the covers or coverplates of electric switches and other electrical units." C. H. Parsons, Ltd., and G. B. Handley. October 25th, 1938. (520631.)

30899. "Sealing of electric conductors through quartz." Thermal Syndicate, Ltd., and F. Reynolds. October 26th, 1938. (520635.)

31032. "Electric measuring and testing apparatus." Standard Telephones and Cables, Ltd., D. H. Black and J. H. Fremlin. October 27th, 1938. (520693.)

31117. "Production of paper for electrical purposes." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. October 27th, 1937. (520701.)

31136. "Spark - quenching arrangements for rotating electric machinery." Automatic Telephone and Electric Co., Ltd., and W. Saville. October 27th, 1938. (520652.)

31159. "Electric indicator circuits employing indicators of the cathode-ray type." Marconi's Wireless Telegraph Co., Ltd. October 27th, 1937. (Addition to 506390.) (520784.)

31160. "Electric indicator circuits employing indicators of the cathode-ray type." Marconi's Wireless Telegraph Co., Ltd. May 12th, 1938. (520655.)

31280. "Alternating electric current induction-type watt-hour meters." G. Wall. G. McCallum, and Metropolitan Vickers Electrical Co., Ltd. October 28th, 1938. (520786.)

31289. "Synchronising signal-separating arrangements for electrical picture transmission systems." W. Jones, and Pye, Ltd. October 28th, 1938. (520709.)

31349. "Electric metal rectifiers of the dry-plate type." Siemens-Schuckertwerke Akt. Ges. October 30th, 1937. (Addition to 477676.) (520738.)

31350. "Polyphase electric transformers." Patentverwertungs - Ges. Hermes." October 30th, 1937. (520739.)

31404. "Testing of electrical insulation." A. Reyrolle and Co., Ltd., J. Harle, I. W. A. Kirkwood and E. A. Livingstone. October 31st, 1938. (520748.)

31427. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. October 30th, 1937. (520751.)

31444. "Transmitting and receiving system for multiplex telephony or such like." Standard Telephones and Cables, Ltd. (Staat der Nederlanden). October 31st, 1938 (Convention date not granted). (520756.)

31455. "Decorative lamp strings." British Thomson-Houston Co., Ltd. October 30th, 1937. (520758.)

31456. "Electric-discharge lamps." British Thomson-Houston Co., Ltd. October 30th, 1937. (520759.)

31461. "Electric fans." General Electric Co., Ltd., and L. G. Ward. October 31st, 1938. (520760.)

31510. "Temperature-responsive variable reactances." Marconi's Wireless Telegraph Co., Ltd., and G. B. Banks. October 31st, 1938. (520832.)

31515. "Device comprising a high-pressure discharge tube." L. W. Meyer (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). November 2nd, 1937. (520835.)

31518. "Apparatus for the coating of wires, cables, textile threads and strips, and the like." Rotalac, Ltd., and W. O. Larmuth. October 31st, 1938. (520766.)

31520. "Electric water-heaters." Santon, Ltd., and H. C. Sanders. October 31st, 1938. (520836.)

31525. "Control of radio transmitters." General Electric Co., Ltd., and A. A. Chubb. November 1st, 1938. (520790.)

31559. "Oscillographs for the direct recording of processes on a band. Soc. Touristique pour le Numerotage et la Signalisation des Routes Soc. Anon. November 1st, 1937. (520791.)

31572. "Dynamo regulators." J. Lucas, Ltd., and J. A. Laird. November 1st, 1938. (520768.)

31584. "Electric frequency changers." Ericsson Telephones, Ltd., and F. W. Hopwood. November 1st, 1938. (520842.)

31594. "Electric switching arrangements in organs." J. W. Walker and Sons, Ltd., and A. H. Symondson. November 1st, 1938. (520843.)

31595. "Electric heaters." G. P. Chamberlain and Co., Ltd., and A. E. Telford. November 1st, 1938. (520844.)

31599. "Lighting fittings." General Electric Co., Ltd., and D. W. Durrante. November 1st, 1938. (520845.)

31602. "High-frequency electric communication cables." Kabushiki Kaisha Sumitomo Densen Seizosho. November 2nd, 1937. (520846.)

31634. "Gas- or vapour-filled electric-discharge devices." Patentverwertungs-Ges. Hermes. November 1st, 1937. (520851.)

31679. "Shades for electric light bulbs." H. Wooldridge. November 2nd, 1938. (520856.)

31703. "Thickening the electrolytes of galvanic elements and batteries." Chloride Electrical Storage Co., Ltd. January 14th, 1938. (520859.)

31729. "Manufacture of thermionic cathodes for thermionic valves." M-O Valve Co., Ltd., and M. Benjamin. November 2nd, 1938. (520861.)

31751. "Rheostats." Murphy Radio, Ltd., Erie Resistor, Ltd., D. N. Truscott and A. A. Dyson. November 2nd, 1938. (520863.)

31767. "Furnaces, ovens, and the like." J. MacDonald, and G.W.B. Electric Furnaces, Ltd. November 2nd, 1938. (520868.)

31877. "Electro-magnetic testing apparatus." A. J. Stephens (Deutsche Schiff-und Maschinenbau Akt.-Ges. November 3rd, 1938. (520871.)

33345. "Multiple commutator dynamo-electric machines." Ercole Marelli & Cie Soc. Anon. June 2nd, 1938. (520801.)

1939

929. "Electric-discharge tube." Egyesult Izzolampa es Villamossagi Reszvent-yarsasag. January 11th, 1938. (520662.)

1584. "Screen for electric illuminating devices." Vereinigte Glühlampen und Elektrizitäts Akt.-Ges. January 17th, 1938. (520664.)

13963. "Heating of glass and other molten conductors in electrode furnaces." Soc. Anon. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain Chauny, et Cirey. May 14th, 1938. (520673.)

15781. "Electric-discharge tubes." Philips Lamps, Ltd. May 31st, 1938. (520820.)

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2660. "Saw-tooth electric oscillation generators." A. C. Cossor, Ltd., L. H. Bedford, L. Jofeh and W. H. Stevens. May 10th, 1938. (Divided out of 519668.) (520824.)

2661. "Cathode-ray tubes." A. C. Cossor, Ltd., L. H. Bedford, L. Jofeh and W. H. Stevens. May 10th, 1938. (Divided out of 519668.) (520723.)

Chester's Application Dismissed

IN a Divisional Court of King's Bench consisting of the Lord Chief Justice and Justices Charles and Humphreys, the hearing was concluded of the case of the King *v.* the Electricity Commissioners *ex parte* the Chester Corporation, on May 22nd. The case arose out of an application for rules directed to the Electricity Commissioners on behalf of the Chester Corporation seeking (1) to order the Commissioners to hear and determine according to law an application for permission to extend the Corporation's generating station at Queensferry; and (2) to quash a decision of the Commissioners in August, 1938, refusing their consent to the extension.

Mr. Montgomery, K.C., for the Corporation, said that the legal question was whether, as the Commissioners contended, Section 13 of the Electricity (Supply) Act, 1922, was implicitly repealed by Section 18 of the Electricity (Supply) Act, 1926. Section 13 of the Act of 1922 said that the Commissioners could consent to the extension of an electricity undertaking if it were proved that the undertakers could supply an adequate and regular service at a cost no greater than that of a supply from some other available source unless the Commissioners considered it was not necessary in the general interest to the electricity supply of the district. All the necessary facts were found in favour of the Corporation when the inquiry was held. Section 18 of the Act of 1926 said that when an application was made by authorised undertakers for their approval or consent, the Commissioners, in determining the question, could withhold the consent by having regard to the provisions of the Act or any scheme or proposed scheme thereunder. The 1926 Act, said counsel, set up the grid system of electricity supply, and the contention of the Commissioners was that the grid, being a scheme under the Act, it was a matter which should be taken into consideration when dealing with the Corporation's application to extend its existing station. The submission of the Corporation was that the 1926 Act did not repeal the earlier one, and that the Commissioners, in refusing consent to the Corporation's application, had acted without jurisdiction and had wrongly exercised their powers because there was no evidence on which they might refuse their consent.

The Attorney-General (Sir D. Somervell, K.C.), for the Commissioners, said he did not agree with the Corporation's suggestion that it was considered by the Commissioners that the Act of 1926 repealed Section 13 of the Act of 1922.

At the conclusion of the arguments Mr. Justice Charles, who delivered the judgment of the Court, said that Chester might grow and there would be no finality to the proposed extension. The Court, in the circumstances, considered that the Commissioners had come to a right conclusion and the application would be dismissed with costs.

FINANCIAL SECTION

New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.

New Companies Registered

Central Rediffusion Services, Ltd.—Private company. Registered May 24th. Capital, £5,000. Objects: To provide services for the relaying or diffusion of messages, broadcast programmes or entertainments, &c. The first directors are: B. H. Lyon, A. J. Falconer and E. C. Sharp. Solicitors: Sydney Morse & Co., Alder House, Aldersgate Street, E.C.1.

Heddon-Smith & Co., Ltd.—Private company. Registered May 23rd. Capital, £500. Objects: To carry on the business of manufacturers, factors, warehousemen, dealers, exporters, importers, general and commission agents and distributors of electrical, scientific and wireless instruments, electric lamps and torches and accessories, &c. R. W. Dreyfus is first and permanent director and secretary. Registered office: 1, Stanhope Street, N.W.1.

Olivers' Radio (Reading), Ltd.—Private company. Objects: To carry on business as manufacturers, importers and exporters of and wholesale and retail dealers in wireless apparatus, electric accumulators and batteries, &c. Permanent directors: E. M. Oliver, 16, Avebury Square, Reading, and A. H. Oliver, 12, Avebury Square, Reading. Secretary: P. E. Oliver. Solicitors: Blandy & Blandy, Reading.

Companies' Returns

Statements of Capital

Electrolumination, Ltd. — Capital, £20,000 in 14,000 ordinary shares of £1 and 120,000 deferred shares of 1s. Return dated January 11th, 1940. 12,000 ordinary and 91,480 deferred shares taken up. £14,574 paid on 12,000 ordinary and 51,480 deferred shares. £2,000 considered as paid on 40,000 deferred shares. Mortgages and charges: £7,500.

Chadwick Electrical Co., Ltd.—Capital, £500 in £1 shares. Return dated January 12th, 1940. Ten shares taken up. £10 paid. Mortgages and charges nil.

Acorn Electrical Co. Ltd.—Capital, £100 in £1 shares. Return dated January 13th, 1940. All shares taken up. £100 paid. Mortgages and charges nil.

Electra (Birmingham 1935), Ltd.—Capital, £500 in £1 shares. Return dated January 31st, 1940. All shares taken up. £500 paid. Mortgages and charges nil.

Allied Electrical Industries Finance Corporation, Ltd.—Capital, £30,000 in £1 shares. Return dated February 5th, 1940. 10,000 shares taken up. £10,000 paid. Mortgages and charges nil.

Greater Felcourt Co., Ltd.—Capital, £10,000 in £1 shares. Return dated December 29th, 1939 (filed February 21st, 1940). All shares taken up. £2,505 5s. paid (£1 on 7 and 5s. on 9,993 shares). Mortgages and charges nil.

Ellis & Mort, Ltd.—Capital, £20,000 in £1 shares. Return dated December 30th, 1939 (filed February 5th, 1940). 15,000 shares taken up. £10,120 paid, £4,880 considered as paid. Mortgages and charges nil.

Whittaker Bros., Ltd.—Capital, £7,000 in 1,000 cum. preferred, 5,000 "A" ordinary and 1,000 "B" ordinary shares of £1. Return dated December 31st, 1939. 3,907 "A" ordinary shares taken up. £3,207 paid. £700 considered as paid. Mortgages and charges nil.

Electrical Repairs, Ltd.—Capital, £300 in £1 shares. Return dated February 15th, 1940. All shares taken up. £300 paid. Mortgages and charges, nil.

Hardman & Co., Ltd.—Capital, £500 in £1 shares. Return dated November 29th, 1939 (filed January 8th, 1940). 480 shares taken up. £480 paid. Mortgages and charges, nil.

City Electrical Engineering Co. (Hull), Ltd.—Capital, £2,500 in £1 shares. Return dated December 31st, 1939 (filed March 14th, 1940). All shares taken up. £2,500 paid. Mortgages and charges nil.

Bartrum, Roylance & Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 31st, 1939. 2,500 shares taken up. £2,500 paid. Mortgages and charges: £1,181 5s. 4d.

Gothic Electrical Supplies, Ltd.—Capital, £50,000 in £1 shares. Return dated January 12th, 1940. 36,000 shares taken up. £5,400 paid, £30,600 considered as paid. Mortgages and charges: £14,500.

Pendleton Electrical and Wireless Co., Ltd.—Capital, £1,000 in 800 ordinary and 200 deferred shares of £1. Return dated December 31st, 1939. 601 ordinary and 200 deferred shares taken up. £601 paid. £200 considered as paid. Mortgages and charges, nil.

Davies, Brickwood and Davies, Ltd.—Capital, £7,000 in £1 shares. Return dated October 13th (filed December 28th), 1939. All shares taken up. £7,000 paid. Mortgages and charges, £3,300.

Scattergood & Johnson, Ltd.—Capital, £10,000 in 2,000 preference and 8,000 ordinary shares of £1. Return dated August 10th, 1939 (filed April 18th, 1940). 8,000 ordinary shares taken up. £1,252 paid. £6,748 considered as paid. Mortgages and charges nil.

Reliance Electrical Wire Co., Ltd.—Capital, £100 in £1 shares. Return dated November 15th, 1939 (filed January 15th, 1940). All shares taken up. £100 paid. Mortgages and charges nil.

Receivers Appointed and Released

Turners (Epsom), Ltd.—Stanley R. C. Sumpter, of 18, Broadway Chambers, W.6, was appointed receiver and manager on May 3rd, 1940, under powers contained in debenture dated August 18th, 1938.

Sun-Lite Lamp Co., Ltd.—Arthur Canlett, of 5, Lower Temple Street, Birmingham, ceased to act as receiver on May 15th, 1940.

Mortgages and Charges

United River Plate Telephone Co., Ltd.—Particulars filed of debentures created outside the United Kingdom to secure 25,000,000 Argentine pesos, authorised March 14th, 1940, and covered by trust deed dated March 15th, 1940, constituting a floating charge on the company's property and assets, present and future, excluding property and assets in the United Kingdom, the amount of the present issue being 7,000,000 pesos. Trustees: Bank of London and South America, Ltd.

Seal Electric, Ltd.—Particulars filed of debentures, not exceeding £4,750, authorised April 30th, 1940, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £3,500.

North Eastern Electric Transport, Ltd.—Debenture, charged on certain specified equipment in Hull and the company's undertaking and other property, present and future, including uncalled capital, dated April 30th, 1940, to secure £652 10s. 5d. Holders: J. W. Gould, 59, Alexandra Road, Hull, and others.

Company Liquidations

Gallagher & Co. (Electricians), Ltd.—Particulars of claims by June 30th to P. Cardwell, liquidator, 1, George Street, Sheffield.

Henley Extrusion Machine Co., Ltd.—Particulars of claims by June 21st to H. Hockley, 5, London Wall Buildings, London, E.C.2.

Glicks Radio, Ltd.—Meetings under Section 245 of the Companies Act, 1929, on June 25th at 35, Windsor Place, Cardiff, to receive an account of the winding up by the liquidator, Mr. L. S. Findlay.

Mardy Electric Light Co., Ltd.—Meeting June 26th at 1-3, Taff Street, Pontypridd, to receive an account of the winding up by the liquidator, Mr. I. E. Evans.

Bankruptcy Proceedings

O. P. Lowther, electrical engineer, 27, Beaufort Mansions, Beaufort Street, London, S.W.—The first meeting of creditors was held on May 16th at London Bankruptcy Buildings. The Official Receiver reported that in April, 1934, the debtor started manufacturing wireless apparatus under the style of the Lowther Manufacturing Co., with a capital of £500. The business was taken over in 1937 by the Lowther Manufacturing Co., Ltd., which was unsuccessful and went into voluntary liquidation in May, 1939. The accounts showed liabilities of £4,029, against assets of £1,000. The debtor attributed his failure to losses sustained in the ordinary course of business, liabilities incurred on behalf of the company, and to a liability under a bill for which he received only a small consideration. In the absence of a quorum the meeting was formally adjourned.

S. Mendelson (Mendelson & Co.), wholesale radio and electrical factors and importers, 12a, Churchgate, Leicester.—Public examination June 7th at the Castle, Leicester.

Reports and Dividends

Edmundsons Electricity Corporation, Ltd., held its annual meeting on May 28th, when Sir Thomas Royden, Bt. (chairman), who presided, said that their policy of consolidation and co-ordinated control of all the companies in Edmundsons group had been pursued during the past year to the greatest degree possible, and six subsidiary companies of the Shropshire group had been liquidated and merged with the parent company. Until the beginning of the war enforced changes in their activities, they had continued their intensive commercial development with satisfactory results. Since September 3rd all activities of this nature, with minor exceptions, had been restricted to those directly related to the national war effort. In spite of the fact that the last four months of the year under review were materially affected by the war, they added 38,700 new consumers, bringing the total to 455,000. They also added 224,000 kW of additional load, making the total connected 1,491,000 kW. Sales of electricity totalled 968.5 million kWh, an increase of 19 per cent. as compared with 1938. In addition, 181.1 million kWh was exported to the Central Electricity Board. During the first four months of 1940 the sales had increased by 24 per cent., as compared with the corresponding four months in 1939.

Sir Thomas said that the steadily increasing costs of operation, distribution and administration in the industry as a whole eventually must result in an increase in the tariffs charged to consumers of every description if the economic stability of the electrical industry was to be maintained. Owing to the extraordinary diversity of geographical location of the numerous undertakings in the Edmundsons group, they had not as yet suffered so severely from war conditions as had many other undertakings. They had, in fact, been helped, in that their output had actually increased. But this increase in volume must go even further and be based upon a much wider diversity of consumption, especially in the field of domestic supply, if they were to hope to avoid what now appeared to be a universal necessity of increases in tariffs. The Wycombe Company's undertaking had been acquired, by the Wycombe Corporation.

With regard to the proposal to increase the capital to £11,500,000 by the creation of £1,500,000 new £1 shares, in view of the necessity of raising further capital in the near future for which they hoped to obtain the required Treasury consent, it was proposed to authorise the increase at the meeting in order to avoid the necessity of calling a special general meeting for that purpose. In the normal course of business prior to the war the company had entered into capital com-

mitments for the necessary expansion of its generating capacity, transmission and distribution systems, which involved the expenditure of about £2,600,000, in addition to the funds available for that purpose from the company's own resources. As already indicated, where possible all expenditure not connected directly or indirectly with the national war effort was suspended. However, in spite of drastic reduction and revisions which were made at that time, and the policy of strict economy and close scrutiny of all capital commitments since maintained, they were confronted with the absolute necessity of raising additional capital.

The report and accounts were adopted, and the proposed increase of capital was approved.

Parkinson & Cowan, Ltd., held their annual meeting on May 22nd, when Lt. Col. H. W. Woodall (chairman and managing director) said that during the short wave of optimism in the early part of 1939 conditions were quite satisfactory. With the outbreak of war, however, the deterioration of the position was so serious that for a time some of their business, particularly that of the Stove Company, was almost paralysed.

At the time of the last annual meeting only a small proportion of their output consisted of armament work. Since the outbreak of war, however, the volume of this class of work in their factories had grown steadily, and their trading companies had been equipping themselves to permit of their handling an increasing volume of war work. The effect of this transition period was particularly severe in the last four months of 1939, and although the position was now better and continued to improve it might be some time yet before their lost turnover was replaced by work included in the national programme of production.

The Cawnpore Electric Corporation, Ltd.—At the annual meeting held on May 22nd Mr. K. A. Scott-Moncrieff (chairman), in reviewing the engineering side, said that they had had a good deal of trouble of a technical nature in relation to the operation of the high-pressure steam plant, but recent reports showed a marked improvement. Progress was being made with the completion of the high-pressure turbine plant, including the shipment and erection of the second 15,000-kW generator, and they had on order a third high-pressure boiler. On the distribution side, 23 miles of new mains were completed and arrangements put in hand for the enlargement and improvement of sub-stations, including some increase in their number.

Cawnpore was a very important centre for the manufacture of army equipment, and they supplied electrical power to nearly all the mills and factories engaged on such work. They found, therefore, a steady increase in the demand for electricity. The year under review had not been free from labour and communal troubles, and these slowed down their progress, but it was gratifying to know that their own employees had, by loyal service, maintained their supply free from interruption from such causes.

Marconi's Wireless Telegraph Co., Ltd.—At the annual meeting on May 22nd Mr. H. A. White (chairman) said that as the greater part of their manufactured products had been sold to foreign governments and Government-controlled corporations the shareholders would not be surprised that the direct and indirect repercussions caused by the outbreak of war had an unfavourable effect on the company's business. They were compelled to suspend work on a number of foreign contracts and the consequent loss was serious in the case of those which, at the end of August, were approaching completion.

Following the beginning of hostilities there was a considerable dislocation of several sections of their business, and although they were quickly able to substitute orders from the home market for the cancelled foreign contracts the period of transition in the last four months of 1939 was financially unprofitable because the new orders could not be completed before the end of the year and consequently the resulting profits could not be included in the accounts now under review. The company's manufacturing output in the last few months had been considerably greater than ever before, and the increased volume of production would partly offset the small percentage of profit permitted in Government contracts. At present more than 90 per cent. of their manufacturing activities were for customers in the British Empire, but the foreign markets which were still accessible were not being neglected and they were planning ahead for the period after the war.

Cable and Wireless (Holding), Ltd.—Presiding at the annual meeting held on May 24th Lord Pender (the Governor) said that he would like to emphasise the reference made by Sir Edward Wilshaw at the meeting of Cable and Wireless, Ltd., to the competition to which that company was exposed from certain foreign cable companies. It could not be too generally known that Cable and Wireless, Ltd., was the only British-owned and operated overseas telegraph company in this country. The system not only served every part of the British Empire, but almost every other part of the civilised world. Foreign companies were allowed to continue to work in this country and it seemed a strange anomaly that the British organisation should have to meet the strenuous competition of these concerns, which lost no opportunity of endeavouring to attract business from the "Via-Imperial" system.

The Oriental Telephone & Electric Co., Ltd.—At the annual meeting on May 21st Sir A. Henry McMahon (chairman) said that their subsidiary and associated companies had, without exception, shown expansion and development during the past year. In Hongkong the telephone development had been quite abnormal in recent years. Additional plant and equipment had been ordered but supplies were slow in coming through and the Hongkong Telephone Co. was finding it difficult to cope with fresh applications for service.

With regard to the option of the Government of India to take over the undertakings of the Indian companies on March 31st, 1943, the Government had suggested that probably the best solution would be for it to take over the systems this year, compensating the companies for the loss of the profits they would have earned up to March 31st, 1943. No offer had yet been received, but they were daily expecting it. The Government of Burma had recently given formal notice of its intention to take over the undertaking of the Rangoon Telephone Co. on March 31st, 1943, and the question of capital expenditure during the intervening period was now being considered.

Siemens Bros. & Co., Ltd., report a profit for 1939 of £306,234 as compared with £301,733 for the preceding year. The general reserve receives £60,000, and it is proposed to pay a dividend of 7½ per cent. (gross) on the ordinary stock for the year (unchanged), and with the balance of £365,627 brought in a total of £373,111 is carried forward. Meeting, June 4th.

Glenfield and Kennedy, Ltd., report a profit for the year to March 31st of £70,549, as compared with £104,648 for the preceding year. The final ordinary dividend is 5 per cent., making 10 per cent. for the year (same) plus a bonus of 7½ per cent. (against 10 per cent.). The balance carried forward is £35,979 (against £34,675 brought in).

W. T. Henley's Telegraph Works Co., Ltd., is again paying a final ordinary dividend of 10 per cent., plus a cash bonus of 5 per cent., both less tax. With the interim dividend of 5 per cent., the total distribution for 1939 is maintained at 20 per cent., less tax. The net profit for 1939, subject to audit, is £343,853, as against £374,042.

The Telephone Manufacturing Co., Ltd., reports a net profit for 1939 of £51,572, an increase of £11,030, as compared with 1938. The dividend on the enlarged capital is maintained at 9 per cent. by the final distribution of 6½ per cent. The balance carried forward is £8,569, as against £6,331 brought in. The report states that a large influx of orders necessitated increased factory accommodation and plant and accordingly new land was acquired and a modern ground floor factory erected with room for considerable expansion. This new factory is fully equipped and is now working to capacity. The total of orders booked to date constitutes a record in the history of the company.

The British Thermostat Co., Ltd., reports a profit for the year to January 31st of £63,978 and a net profit of £25,616, as compared with £31,586 for the previous year. The final dividend is 11 per cent., making 18½ per cent. for the year (unchanged) and £14,549 is carried forward (against £16,683 brought in).

The Canadian General Electric Co. reports a net income for 1939 of $2,150,027 as compared with $1,883,581. The preference dividends absorb $95,000 and the common dividends $1,133,070 (same). The balance carried forward is $8,955,127 (against $8,033,170 brought in).

Whitehall Electric Investments, Ltd., reports a net income for the year ended March 31st of £208,001, a decrease of £2,072 as compared with 1938-39. The full year's dividend has again been paid on the 7½ per cent. preference stock, and the balance carried forward is £410,002 (against £389,501 brought in).

The Tellus Super Vacuum Cleaner, Ltd., reports a trading profit for 1939 of £109. Loss on foreign exchange amounts to £6,283, written off plant, &c., £110, depreciation £25, and directors' fees, £200. The debit carried forward is £12,481 (against £5,973 brought in).

The Hydro Electric Securities Corporation reports a net profit for 1939 of $514,743 as compared with $637,706 for 1938. A common dividend of 20 cents per share paid in April, 1939, absorbed $295,278 (against 20 cents paid in August, 1938).

The West of England Electric Investments, Ltd., reports a net income for the year to March 31st of £66,713 as compared with £56,435 for 1938-39. The dividend for the year is 7 per cent. and £17,191 is carried forward against £10,706 brought in. The dividend for the preceding year was 7 per cent., but was paid on smaller capital.

British Timken, Ltd., reports a net profit for 1939 of £115,619, an increase of nearly £24,000 as compared with 1938. Taxation reserve receives £55,000, and general reserve £23,427, leaving a balance of £37,192, which with £22,868 brought in makes £60,060. The ordinary dividend for the year is maintained at 15 per cent., less tax, and £26,310 is carried forward.

The Electrolux Corporation reports a net profit for 1939 of $1,658,469, a decrease of $382,453 as compared with 1938. The earnings per share were $1.34 (against $1.65), and the dividends totalled $1.20 per share.

The British Electric Traction Co., Ltd.—In view of the provisions of the Limitation of Dividends Bill, the directors state that they are unable at present to make any recommendation as to the dividend to be paid for the year ended March 31st. The gross revenue for the year amounts to £745,874, as compared with £728,513 for the previous year, and the profit (subject to audit) after charging debenture stock interest and expenses, but before providing for income tax, is £603,054, as against £587,107. It is, however, thought necessary to provide £50,000 for excess profits tax, and the amount ultimately available for dividend on the deferred ordinary stock would in ordinary circumstances be enough to pay a dividend of 50 per cent. less tax. It is the intention of the Board to make application to the Treasury at the earliest opportunity for an increase in the maximum distribution on the deferred ordinary stock permitted under the general provisions of the Bill, as in their view there are special circumstances affecting the company which justify such an increase. As soon as the application has been dealt with by the Treasury a further announcement will be made.

The City of Buenos Ayres Tramways Co. (1904), Ltd., proposes an extension for two years to July 1st, 1942, of the moratorium of 2¼ years granted in respect of the annuity payable by the Anglo-Argentine Tramways Co.

The Metropolitan Electric Cable and Construction Co., Ltd., has decided to reduce the rate of dividend announced last month. It was then intended to pay 8 per cent., less tax, for 1939, but it is now proposed to pay 7½ per cent., less tax.

The National Electric Construction Co., Ltd., is paying a first and final dividend of 10 per cent. cent. (unchanged).

The Electrical Finance & Securities Co., Ltd., has announced a final dividend of 6 per cent., plus a bonus of 2½ per cent., making 12½ per cent. for the year (same).

The Palestine Electric Corporation, Ltd., has declared the half-yearly dividend on the 4½ per cent. redeemable cumulative preference shares and 4½ per cent. second redeemable cumulative preference shares.

STOCKS AND SHARES

TUESDAY EVENING.

THE gravity of the war situation was deepened on this, Tuesday, morning by the news that the King of the Belgians, against the wishes of his own Ministers, had decided to capitulate. Among all the rumours which had been current in the Stock Exchange since the war broke out, no place had been given to any supposition of this character.

The news came as a shock. It produced very little selling. This was just as well, because buyers were conspicuously absent. As a result of the defection, prices all round the markets were lowered whether there was any business to test them or not. On the previous days, the movements were nearly all downwards. The Belgian news added emphasis to the depression that had previously been apparent. A sense of financial values became lost in the more pressing consideration of war news, and it will be seen, by reference to the price lists, that in a good many cases, even in such steady-going markets as those with which our price-lists deal, the declines have been heavy.

The principal falls this week have occurred in Home Railway stocks. Southern 5 per cent. preferred followed up its drop of 11 points last week with a further decline of 4½ points, and the company's 5 per cent. preference stock, usually a staid and slow-moving security, is 6 points down at 88½ comparing with 98½ a fortnight ago. Most of the leaders in the Home Electricity Supply shares have gone back from 6d. to 1s. 9d. Gilt-edged stocks followed the general trend. Amongst the equipment and manufacturing shares, depression is general. Ever Ready from 28s. 6d. three weeks ago, have come down to 21s. 3d. In the armament group, Vickers show a further fall at 14s. 3d. A number of shares in our lists to-day reached the lowest levels hitherto touched during the present twelve-month.

The Question of Quotations

It will be readily understood that in market conditions such as those of to-day, Stock Exchange quotations tend to become more nominal than usual. The prices given in our weekly lists are the middle figures of those in the Stock Exchange Official Lists at the close of business on Tuesday. These official prices are supplied by dealers in the various Stock Exchange markets. They are accepted as the basis for valuations by the Inland Revenue and other Government Departments. In normal circumstances, it is possible for a prospective purchaser to get his shares at a little above the middle price, and for the would-be seller to realise his shares at a trifle below it.

Sometimes either the buyer or the seller will find his business done at the middle price: it depends upon which happens to be the more pressing—the anxiety to buy or the desire to sell. The prices given in our weekly lists furnish the official reflection of what the market price is. Neither they nor any others can provide what is called "the touch," because that may vary according to the state of different dealers' books at the same moment. In days of crisis, business contracts: buyers go to work with the greater caution as sellers exhibit the greater anxiety to liquefy their positions. Prices, therefore, tend to become more nominal, and this is what is happening to-day.

Cable and Wireless

Holders of Cable and Wireless (Holding) stocks now have as clear an idea of the position as the fog of war permits as a result of meetings held last week by both the holding and operating concerns and by Marconi's Wireless Telegraph Co., the manufacturing subsidiary. From the results already published, the situation had been made plain so far as the outcome of the year's working was concerned. The increase in the holding company's revenue as a result of an outstandingly successful year, on the part of the operating concern, was roughly cancelled out by a fall in dividends from other sources, notably in the case of the Marconi interest.

The latter, it transpires, incurred substantial losses of income and business on account of the important trading connections in some of the now unhappiest parts of the world; the replacement of this business with other contracts is taking time, trouble and expense. On the other side of the Holding Company's picture, the details now given are a tribute to the enterprise of the management in fostering cable traffic by such inducements as the Empire flat-rate scheme and other measures correctly calculated to stimulate the use of the services. On strategic grounds, the importance of the system in these times needed no underlining. On the question of prospects, the chairmen were discreetly non-committal, but an undertone of confidence ran through their speeches. Nevertheless, the proceedings failed to put fresh heart into the stocks concerned, Cable and Wireless ordinary remaining heavy around 50. The preference is 2 points down at 92½.

Cable Manufacturing Shares

Henley's Telegraph Works' profits for 1939 show, according to the preliminary statement, a contraction of modest proportions. The dividend is again brought up to 20 per cent. for the year—the same as has been paid since the 100 per cent. share bonus of 1936. Undistributed profits permit additions to the reserves on the usual generous scale, the allocation of £100,000 being the same as for 1938. Taken with other cable manufacturers' results published this year, the Henley announcement upholds the reputation of this particular class of share. The following gives an idea of how some of the leading concerns fared in a year covering four months of war:—

Ordinary Shares	Net Profit 1938	Net Profit 1939	Dividend % 1938	Dividend % 1939
	£	£		
Henley's	374,642	343,853	20	20
British Insulated	597,066	572,581	20	20
Enfield Cable	172,750	162,502	16¼	16¼
Telegraph Constn.	62,923	62,973	10	10

(and cap. bon. 5)

While retaining their particular appeal for investment that is interested in industrial shares of a proved and tested character, the shares have not escaped depreciation in price. Yields, however, are still moderate by present standards.

Miscellaneous Matters

As a company registered comparatively recently, Taylor Tunnicliff (Electrical Industries) are set such a problem by recent Budget innovations that the accounts appear without any ordinary dividend decision having been reached. Even if the exact liability to the Excess Profits Tax could be established, the explanation of the law limiting wartime dividends would apparently remain as another conundrum. Here is an extreme case of the wartime complexities which bestrew the industrial markets, although seldom, fortunately, to such effect. Whitehall Electric Investments have again succeeded in earning the 7½ per cent. preference dividend with a small margin. The yield of 11½ per cent. on the shares, at 13s., reflects the uncertainty associated with interests which, in this case, extend from West of England electricity undertakings to others in Greece, Spain and America. Atlas Electric results are due next month. Here also the 7 per cent. preference dividend is expected again to be covered with little to spare for the ordinary capital. The ordinary shares have fallen to 2s.; the preference stand at around 20s. The investments are of a general character, but a large part of the capital is tied up in the Montevideo electrical enterprise which has been unproductive for some years. Oriental Telephone and Electric is among the companies which have decided to drop the practice of paying tax-free dividends. Telephone Manufacturing issued a progressive report, and is maintaining the dividend at 8 per cent. on a larger amount of capital. Telephone Properties' profits for 1939 are £16,000 lower than before, at £37,200, but the dividend is to be 6 per cent. for the third consecutive year.

Depression in Home Rails

The market in Home Railway stocks is virtually the only section of the Stock Exchange to have given way to anything approaching demoralisation since the latest turn of the war. It is no coincidence that the same market has been among the few in which speculation has lately been "chancing its arm" beyond the strict bounds of discretion. Signs of a crack appeared together with more serious conjecture as to the scope for damage by enemy attack, the cost of which falls upon the companies for any sum over £10 millions in a single year. Consequently there has been a snatching of profits or a cutting of losses, and probably some necessitous dumping by those holders possessed of the weakest financial or moral resources. The result is a fall of anything up to 20 points, as compared with prices earlier this year. Yields are now shown that reach double figures on stocks whose interest is covered by Government guarantees vulnerable only to very heavy war damage (or financial provision against it). But the companies come into the category of controlled undertakings that are liable for 100 p.c. E.P.T., and this adds one more to the other prejudicial factors.

Market Steadiness

By way of illustrating the soundness of the market for electricity supply shares, it may be of interest to mention that at the end of last week a broker came into the Stock Exchange market with a fairly long string of shares in electrical companies which had been given him to sell. The dealer to whom he went, quoting him the prices and not knowing, of course, whether the broker was a buyer or a seller, made him, as the Stock Exchange phrase is, fairly close prices in every case. The broker, to his astonishment, found that he was able to sell all the shares in his somewhat extensive order at market prices and at what, on the nominal quotations, appeared to be good figures. Impartiality compels the acknowledgment that, if the order had been a few days later its execution would have been a good deal more difficult.

Air Raid Risks

The malcontents who complain of the manner in which their electric lighting accounts have increased are reminded in the first place of the blackout and, in the second, of the severity of the weather last winter. Moreover, many consumers have gone out of town, but local rates have not fallen. In fact, the last-named have been increased in various cases. The possibility of some particular power station being damaged by air-raid may be actuarially slight but the apprehension of such a thing does, of course, remain. From the manner in which prices of ordinary shares in the electricity supply market have dwinded during the past few weeks, it is evident that some of the holders preferred to let their shares go, rather than run whatever chance there may be of physical damage to their property. The Government is expected to pay compensation at the end of the war, but this consideration has not entirely removed uneasiness from the mind of every investor.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 High-est	1940 Low-est	Dividend Pre-vious	Dividend Last	Middle Price May 28	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	57/–	15	15	57/6	—	5 5 0
British Power and Light	30/–	25/–	7	7	25/–	–1/–	5 12 0
City of London	28/–	23/–	7½	7½	23/–	—	6 7 8
Clyde Valley	38/6	33/–	8	8	33/9	–1/6	4 14 10
County of London	43/3	32/–	10½	10½	32/–	–1/9	6 11 4
Edmundson's :							
7% Pref.	31/6	28/–	7	7	31/3	—	4 9 7
Ord.	27/6	21/9	9	6	23/–	—	5 4 4
Elec. Dis. Yorkshire	40/3	35/9	9	9	36/3	–1/6	4 19 4
Elec. Fin. and Securities	41/3	40/–	12½	12½	40/–	–1/6	6 5 0
Elec. Supply Corporation	46/3	41/–	12	11½	42/6	–1/6	5 8 3
Isle of Thanet	16/–	12/6	4	4	13/–	—	6 3 1
Lancs Light and Power	33/–	28/6	7½	7½	28/9	–9d.	5 4 4
Llanelly Elec.	21/–	19/6	5½	5½	20/6	–6d.	5 7 4
Lond. Assoc. Electric	21/–	16/–	7	5½	16/3	–9d.	6 15 4
London Electric	37/6	25/–	8	7½	25/–	—	5 16 0
London Power Deb. Red.	105½	103	5	5	104½	—	4 15 6
Metropolitan	41/6	32/–	12	10	32/–	–1/9	6 5 0
Midland Counties	39/–	32/–	8	8	32/6	–1/6	4 18 6
Mid. Elec. Power	40/–	36/–	8	9	37/6	—	4 16 0
Newcastle Elec.	29/9	26/–	7	7	26/3	–1/6	5 6 8
North Eastern Electric :							
Ordinary	31/6	26/–	7	7	26/–	—	5 7 8
7% Pref.	32/6	30/–	7	7	30/–	—	4 13 4
Northampton	48/–	41/–	10	10	42/6	—	4 14 1
Notting Hill 6% Pref. (£10)	10¾	10	6	6	10¾	—	—
Northmet Power :							
Ordinary	42/3	32/–	10	10	32/–	–6d.	6 5 0
6% Pref.	29/–	26/9	6	6	27/6	—	4 7 3
Richmond Elec.	24/6	22/9	7	6	23/9	—	5 1 1
Scottish Power	38/–	31/9	8	8	32/–	–6d.	5 0 0
Southern Areas	21/3	18/–	5	5	18/–	–6d.	5 11 1
South London	23/3	22/–	7	7	22/–	—	6 7 3
West Devon	20/–	18/6	5	5	20/–	—	5 0 0
West Glos.	21/3	16/6	2	2½	21/3	—	2 10 0
Yorkshire Elec.	40/–	32/3	8	8	32/6	–1/6	4 18 6
Overseas Electricity Companies							
Atlas Elec.	4/–	2/–	Nil	Nil	2/–	–6d.	—
Calcutta Elec.	37/–	30/–	10*	8*	29/6	–1/6	5 8 6
Cawnpore Elec.	30/–	28/6	10	10	28/–	—	6 19 2
East African Power	25/6	23/3	7	7	25/–	–6d.	5 12 0
Jerusalem Elec.	24/–	21/6	7	7	23/–	—	6 1 9
Kalgoorlie (10/–)	12/6	9/6	7½	7	12/–	—	5 16 8
Madras	26/9	26/–	8*	8*	26/3	—	—
Montreal Power	35½	30	1½	1½	32½	+2	—
Palestine Elec. "A"	25/–	21/–	7½*	5*	21/3	—	4 14 1
Perak Hydro-electric	20/3	15/–	6	2½	15/–	—	3 6 8
Shawinigan Power	27½	20	83cts.	90cts.	21	–1	—
Tokyo Elec. 6%	69	57	6	6	57½	—	10 8 8
Victoria Falls Power	75/9	67/–	12½	15	67/6	–2/6	4 8 9
Whitehall Investments Pref.	17/9	12/6	7½	7½	13/–	–1/–	11 10 10
Public Boards							
Central Electricity :							
1950–70	110½	107	5	5	107½	–1½	4 13 0
1955–75	112½	108½	5	5	108½	–2½	4 12 2
1951–73	107½	103	4½	4½	103½	–2½	4 7 0
1963–93	96½	90	3½	3½	92½	–1	3 15 8
London Elec. Trans Gtd.	92	87½	2½	2½	91	—	2 15 0
London & Home Counties							
1955–75	113½	105	4½	4½	105½	–1½	4 5 4
Lond. Passenger Transport							
A	116	104	4½	4½	107½	–1	4 3 9
B	116	103	5	5	104½	–4	4 15 8
C	65½	36	1½	—	37½	—	—
West Midland Joint Elec.,							
1948–68	106½	105	5	5	106½	—	4 14 0
Telegraph and Telephone							
American Tel. & Tel.	215	180	9	9	180	–10	5 0 0
Anglo-Am. Tel. :							
Pref.	106	93½	6	6	100½	–3	5 19 5
Def.	23¾	21	1½	1½	22	—	6 16 4
Anglo-Portuguese	22/6	19/9	8	8	20/–	—	8 0 0
Cable & Wireless :							
5½% Pref.	99¾	88	4½	5½	92½	–2	5 19 0
Ord.	65	46	4	4	50	—	8 0 0
Income	99¾	93	—	—	99½	—	4 0 5
Canadian Marconi $1	6/–	4/6	Nil	4cts.	5/–	—	—
Globe Tel. & Tel. :							
Ord.	32/6	28/6	7½*	7½*	32/6	—	4 12 4
Pref.	28/9	24/6	6	6	26/3	–⅛	4 11 3
Great Northern Tel. (£10)	20	11	20	20	13	—	15 7 8
Inter. Tel. & Tel.	5½	3	Nil	Nil	3	—	—
Marconi-Marine	30/–	23/6	10	7½	23/9	—	6 6 4
Oriental Telephone Ord.	2⅞	53/6	12*	11½*	2¾	—	4 3 8
Telephone Props.	15/–	13/3	5	6	15/–xd.	+9d.	8 14 6
Telephone Rentals (5/–)	9/6	7/6	10	10	8/–	—	5 6 5
Traction and Transport							
Anglo-Arg. Trams :							
First Pref. (£5)	4/3	3/0	Nil	Nil	3/–	–1/–	—
4% Inc.	11½	6	Nil	Nil	6½	–3	—
British Electric Traction :							
Def. Ord.	830	450	5	5	450	–75	—
Pref. Ord.	169	147½	8	8	165	—	4 17 0
Bristol Trams	48/6	42/–	10	8*	42/6	–⅛	3 15 6
Brazil Traction	12¼	7½	$1	50c.	7⅞	—	—
Calcutta Trams	24/–	21/–	8	8	21/3	—	7 19 7
Cape Elec. Trams	18/6	16/–	5	5	18/6	—	5 8 1
Lancs Transport	35/–	28/3	10	10	35/–	—	5 14 8
Mexican Light :							
1st Bonds	33	28	5	5	30½	—	—
Rio 5% Bonds	90	74	5	5	80	—	6 5 0
Southern Rly. :							
5% Prefd.	79	50	5	5	50½	–4½	9 18 0
5% Pref.	104½	88	5	5	88½	–6	5 13 0
T. Tilling	45/9	36/–	10	10	37/6	—	5 6 8
Tilling & B.A.	47/6	43/9	9*	8*	47/6	—	3 7 10
West Riding	35/–	28/6	10	10	33/–	—	6 1 3
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	15/–	15	15	17/6	—	—
Assoc. Elec. :							
Ord.	43/3	37/6	10	10	37/6	—	5 6 8
Pref.	35/3	32/3	8	8	35/–	—	4 11 5
Automatic Telephone & El.	47/3	42/–	12½	12½	43/9	—	5 14 1
Babcock & Wilcox	50/–	38/9	10	11	38/9	–16	5 13 5
British Aluminium Ord.	56/–	43/6	12½	12½	44/6	+9d.	5 12 3
British Insulated Ord.	92/6	78/9	20	20	81/3	–4	4 18 3
British Thermostat (5/–)	14/9	11/9	18½	18½	12/6	—	7 8 0
British Vacuum Cleaner (5/-)	12/6	8/6	40	12½	10/–	—	6 5 0
Brush Ord.	4/6	3/–	Nil	Nil	3/3	—	—
Callender's	69/–	57/–	20	15	57/6	–½	5 4 4
Chloride Elec. Storage	72/6	68/–	20	15	3½	–½	4 5 9
Consolidated Signal	72/6	59/–	36½	17	38½	—	4 13 10
Crabtree (10/–)	24/9	21/–	17½	17½	23/9	—	7 7 4
Crompton Parkinson :							
Ord. (5/–)	20/–	15/–	15	20	15/–	—	6 13 4
E. K. Cole (5/–)	5/–	3/3	10	Nil	4/–	—	—
Elec. & Musical Industries (10/–)	10/3	6/3	5	Nil	6/6	–1/6	—
Electric Construction	36/3	32/6	12½	13½	35/–	—	7 14 2
Enfield Cable Ord.	56/–	46/3	25	16¼	48/9	–8	6 13 2
Electrical Switchgear (10/–)	22/6	20/–	16	10	20/–	—	5 0 0
English Electric	33/9	28/6	10	10	28/9	–⅛	6 19 4
Ensign Lamps (5/–)	15/3	13/9	25	25	13/9	—	9 1 10
Ericsson Tel. (5/–)	39/3	30/–	25*	25*	30/–	–⅛	4 3 4
Ever Ready (5/–)	28/3	21/–	30	40	21/3	–2/3	9 8 2
Falk Stadelmann	18/3	17/6	10	6	17/6	—	6 17 4
Ferranti Pref.	25/–	23/–	7	7	25/–	—	5 12 0
G.E.C. :							
Pref.	32/6	28/–	6½	6½	29/6xd.	–1/–	4 8 3
Ord.	83/3	74/3	17½	20	76/–	—	5 5 3
Greenwood & Batley	25/6	23/9	15	15	23/9	—	12 12 8
Hall Telephone (10/–)	18/6	15/–	15	10	15/–	—	6 13 4
Henley's (5/–)	21/6	17/3	20	20	17/6	—	5 14 3
4½% Pref.	21/3	20/6	4½	4½	21/3	—	4 4 8
Hopkinsons	46/9	42/6	12½	15	42/6	–⅛	7 1 2
India-Rubber Pref.	21/–	20/3	5½	5½	20/9	—	5 6 0
Intl. Combustion	121/3	105/–	32½	32½	5⅜	–¼	6 1 10
J. Lucas	60/6	53/3	15	15	57/6	—	5 4 5
Johnson & Phillips	50/9	41/–	12½	15	41/3	–5/–	7 5 0
Lancashire Dynamo	59/9	53/–	25	20	55/–	—	7 5 6
Laurence Scott (5/–)	11/–	9/3	15	15	9/6	—	7 17 10
London Elec. Wire	25/6	25/–	12	7½	25/–	—	6 0 0
Mather & Platt	46/6	36/3	13½	10	37/6	–9d.	5 6 7
Metropolitan Elec. Cable Pf.	22/–	21/3	5½	5½	21/3	—	5 3 6
Murex	86/9	73/6	20	20	73/9	—	5 8 5
Pye Deferred (5/–)	9/–	7/–	25	25	9/–	—	13 17 9
Revo (10/–)	20/9	16/3	17½	17½	17/6	—	10 0 0
Reyrolle	60/6	50/–	12½	12½	51/3	–⅛	4 17 6
Siemens Ord.	23/9	18/9	7½	7½	18/9	–1/–	8 0 0
Strand Elec. (5/–)	2/3	1/9	10	4	2/–	—	10 0 0
S. Smith (1/–)	8/–	7/–	37½	50	7/6	—	6 13 4
Switchgear & Cowans (5/–)	11/9	7/6	20	10	10/–	—	5 0 0
Telegraph Condenser (10/–)	8/9	6/3	5	—	8/9	—	—
Telegraph Construction	42/6	32/6	10	10	37/6	—	5 6 8
Telephone Mfg. (5/–)	9/–	7/6	9	9	7/6xd.	–3d.	6 0 0
Tube Investments	96/9	84/–	23¾	23¾	4¼	–¼	5 13 0
Vactric (5/–)	3/6	2/–	4	Nil	3/3	—	—
Vickers (10/–)	22/–	4/–	10	10	14/3	–1/6	7 0 4
Ward & Goldstone (5/–)	19/9	19/3	20	20	19/9	—	5 1 3
Westinghouse Brake	46/–	32/9	17½	10	40/–	–⅛	5 0 0
Walsall Conduits (4/–)	26/6	23/9	55	55	26/3	—	8 7 8
West, Allen (5/–)	7/–	5/–	10	7½	5/–	–6d.	7 10 0

* Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.

Australia.—NEW SOUTH WALES.—October 24th. Sydney County Council. 50,000-kW turbo-generator. (See p. 550, May 17th issue.)

MELBOURNE.—June 25th. State Electricity Commission of Victoria. V.i.r. cables. (T. 19369/40.)*

June 25th. Cable. (T. 19609/40.)*

July 23rd. Voltage regulating equipment. (T. 19531/40.)*

Beckenham.—June 10th. Electricity Department. Coal supply. (May 24th.)

Belfast.—June 7th. Electricity Department. Underground cables, pilot and telephone cables, 33-, 22- and 6.6-kV switchgear and cabling and three-phase low-voltage switchgear. (May 24th.)

Birmingham.—June 6th. Salvage Department. Twelve electric battery-driven refuse vehicles. Specifications from the general manager, Salvage Department, 161, Corporation Street (deposit £1 1s.); tenders to town clerk's office (room 10), Council House.

June 7th. Electric Supply Committee. Substation (building only) at Heathleigh Road, Greenacres Estate, King's Norton. F. Forest, chief engineer and manager, 14, Dale End, Birmingham, 4.

Burnley. — June 17th. Corporation. Extra-high-voltage switchgear and cables. (See this issue.)

Bury.—June 17th. Electricity Department. Supply, delivery, laying and jointing of 11-kV cable; one 5,000-kVA transformer. (See this issue.)

Dunfermline.—June 10th. Scottish Special Housing Association, Ltd. Various works, including electric lighting, at Brucefield housing scheme (100 houses). Schedules from N. J. Campbell, secretary, 11, Drumsheugh Gardens, Edinburgh, 3, to whom tenders are to be sent.

Exeter.—June 7th. Electricity Department. Coal-handling plant. (May 24th.).

Heywood.—June 17th. Electricity Department. Supply, delivery, laying and jointing of 11-kV cables, supply and connecting up one 5,000-kVA transformer, and 11- and 66-kV switchgear. (See this issue.)

India.—CALCUTTA.—June 11th. Indian Stores Department. Train lighting cells. (T.19822/40.)*

Macclesfield.—June 13th. Electricity Department. E.h.v. and l.v. cables. (May 10th.)

Manchester.—June 7th. Electricity Committee. Ash- and coal-handling plant. (May 24th.)

Morocco.—RABAT.—June 11th. Director of Posts, Telegraphs and Telephones. Static rectifier. (T. 19593/40.)*

Newark-on-Trent.—June 15th. Electricity Department. 11-kV metal-clad ring main unit and a 50-kVA transformer. (May 24th.)

New Zealand. — WELLINGTON.—Posts and Telegraph Department. June 20th. 1,800 lb. of insulating and sealing compound. (T. 19165/40.)*

June 25th. Public Works Department. One 11-kV outdoor-type oil-immersed circuit-breaker. (T.Y. 18700/40.)*

Switchgear, &c (T. 19182/40.)*

June 25th. Suspension insulators. (T.19809/40.)*

July 9th. Three 4,500-kVA voltage regulating transformers. (T. 19163/40.)* One 4,500-kVA voltage regulating transformer. (T. 19162/40.)*

July 16th. Equipment for the remote control of switchgear and transformers at Mt. Roskill substation from Penrose substation. (T. 19161/40.)*

Sheffield.—June 5th. Electricity Department. Two 15,000-kVA transformers. (May 10th.)

South Africa. — JOHANNESBURG.—June 12th. City Council. Two 1,500-A, 600-V, DC current limiters. (T. 19392/40.)*

June 15th. Cable and boxes. (T. 19400/40.)*

July 10th. Ten l.v. switchboards. (T. 19395/40.)*

CAPE TOWN.—July 3rd. Electricity Department. Secondary battery and battery charging equipment. (T. 19635/40.)

PORT ELIZABETH.—June 20th. Battery-driven tower wagon and l.v. cable. (T. 19657/40.)*

Stourbridge.—June 8th. Upper Stour Valley Main Sewerage Board. Periodical examination and testing of electrically operated pumping plant at sewage pumping stations. Particulars from the Board's engineer, G. P. Deeley, 13, Church Street.

West Riding.—June 12th. County Council. Automatic telephone installation in the Knaresborough Institution. Specifications from the acting county architect, County Hall, Wakefield.

Orders Placed

Birkenhead. — Markets Committee. Accepted. Electric lighting alterations at Tranmere abattoir (£264).—Economic Electric Co. (Liverpool).

Electricity Committee.—Transformers: Contract renewed for twelve months at 12½ per cent. increase.—G.E.C.

Health Committee.—Accepted. Electrically heated incubator.—C. Hearson and Co.

Brighton.—Town Council. Accepted. Supply, erection and testing of two new steam-raising units each of 350,000 lb. per hour evaporative capacity (CMR) at Southwick power station extension (£454,100).—Babcock & Wilcox. In our last issue the contract price was erroneously given as £54,100.

Glasgow.—Transport Committee. Accepted. Dynamometers for Larkfield workshops.—Heenan & Froude, McFarlane Engineering Co. Stores and materials for one year: Cables.—Scottish Cables; Liverpool Electric Cable Co. Electrodes.—W. Gilmour Smith & Co.; Quasi-Arc Co.; Metropolitan-Vickers Electrical Co. Lamps.—Aurora Lamps; Edison Swan Electric Co.; G.E.C.; B.T.H.; Siemens Electric Lamps & Supplies; Metropolitan-Vickers Electrical Co.; Crompton Parkinson; Cryselco.

Lighting Committee. Accepted. Annual stores: Electrical fittings and accessories.—British Electrical and Manufacturing Co.; Wm. Geipel; Falk, Stadelmann & Co.; Revo Electric Co.

Grimsby.—Cleansing Committee. Recommended. Battery for electric vehicle (£169).—Chloride Electrical Storage Co.

Ipswich.—Watch Committee. Recommended. Street fire alarms (£950).—Walters Electrical Manufacturing Co.

Isle of Wight.—County Council. Accepted. Electrical work in connection with alterations to Ventnor branch library (£105).—H. T. Saunders.

London.—FULHAM. — Electricity and Lighting Committee. Accepted. Ash-handling plant (£28,532).—Babcock & Wilcox.

Nottinghamshire.—C.C. Roads Committee. Recommended. Traffic signals at Cossall Aqueduct (£503). — Automatic Telephone & Electric Co.

Weymouth.—Electricity Committee. Recommended. Cable: Renewal of contract on month-by-month basis. — Scottish Cables.

Accepted.—Six transformers (£667).—Bryce, Ltd. Two transformers (£1,749).—English Electric Co.

Trade Mark Applications

AMONG recent applications for British trade marks are the following, objections against any of which may be entered within one month from May 22nd:—

Featalak. No. 609481. Class 2 (IV). Synthetic resin and moulding powders made therefrom. Featly Products, Ltd., 22, Cornbrook Park Road, Manchester.

Crypto. No. 610987. Class 7 (IV). Electric automatic vegetable and fruit-chip cutting machines, electrically and hand-driven sausage filling machines, electric bowl cutters, &c.—Lancashire Dynamo & Crypto, Ltd., Acton Lane, Willesden, N.W.10.

Lumastic. No. 610413. Class 9 (IV). Luminous advertising signs, fire alarms, electric batteries, switch bulbs, electric cut-outs, door openers, switches and telephones, &c., all made principally of synthetic resin.—Harry Marsden Smith, 16, Southern House, Cannon Street, E.C.4.

Redifon. No. 610868. Class 9 (IV). Instruments, apparatus and parts thereof for the production, transmission, reception, &c., of carrier wave, telegraphic, telephonic, television or acoustic frequency signals or for direction finding.—Rediffusion, Ltd., Bush House, Aldwych, W.C.2.

Westalite. No. 611137. Class 9 (IV). Alternating electric current rectifiers of the selenium type.—Westinghouse Brake and Signal Co., Ltd., 82, York Way, King's Cross, N.1.

Light Concentration

PARTICULARS of a lighting fitting designed to give a narrow beam of light by the inclusion of reflecting surfaces normally inside the glass envelope have been sent us by Paymaster-Capt. R. R. Hoare, 116, Pall Mall, S.W.1. One reflector (circular) is at the back of the filament and, in bulb lamps, between it and the lamp cap. Two other reflectors of a shape that differs with requirements are set at the sides with the top edges close to the filament, opening out downwards to a mouth which is dimensioned in accordance with the width of beam required. It is stated that silvering of the reflecting side faces is unnecessary since all rays falling on them do so at angles greater than the angle of total internal reflection of the glass.

Swiss Hydro-electric Scheme

CONSTRUCTION of a new hydro-electric plant at Verbois, near Geneva, has been started. Precautions for ensuring a proper flow of the water limit the maximum head to 68ft.—54ft. due to the dam and 14ft. to dredging below it and shortening the river course.

The four works—a dyke on each bank, a dam across the river and the power plant—will carry a road across the valley. An outdoor substation, stepping up from the generator voltage of 18 kV to the 125 kV of the Swiss high-voltage network, is situated just below the plant. Connections to the Geneva network are at 18 kV.

The power station building, 374ft. long, is divided into three sections. The turbine room, 230ft. long, is to contain three sets (with provision for a fourth) comprising vertical-shaft 31,500 HP Kaplan turbines, operating with a net head of 68ft. and a flow of 4,500 cu. ft. per sec., direct coupled to 27,500-kVA, 50-cycle, 136.4-RPM alternators.

Each turbine weighs about 400 tons, and has a guaranteed efficiency of 90.5 per cent. under the most favourable conditions of head and flow. The all-welded alternators weigh about 295 tons.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Houses for industrial workers (100); borough engineer.

Acton.—Additions for Silknit, Ltd., Park Royal Road; J. Cammell, architect.

Birmingham.—Buildings, Digbeth; W. J. Whittall & Sons, builders, Lancaster Street, Birmingham.

Premises at Cape Hill, Smethwick, for Montague Burton, Ltd.; Architects' Department, Hudson Road, Leeds.

Four-storey building, Bull Ring, for Horton's Estates, Ltd., Colmore Row, Birmingham; C. Wade & Co., engineers, Aston Road, Birmingham.

Extensions to factory, Tyburn Road, for Constructors, Ltd., Nickel Works, Tyburn Road; W. J. Whittall & Sons, Ltd., contractors, 132, Lancaster Street, Birmingham, 4.

Boston.—Factory, Tawney Street; J. & J. Beaulah, Ltd., canners, 52, Wide Bargate.

Bury.—Extensions to Mount Zion Bleach Works, for Bleachers Association, Ltd., Blackfriars House, Parsonage, Manchester; John Dickinson & Co. (Builders), Ltd., Fairclough Street, Bolton.

Chatham.—Eight surface shelters, Empire Car Park, &c.; borough engineer.

Cheadle.—Commercial garage, Leek Road, Cheddleton; Berrisford Motors, Ltd., Sunnyside, Wetley Rocks.

Chelmsford.—Three shelters (50 persons each), Cathedral Schools, Victoria Road, for B.C.; V. J. Willis, borough engineer, Municipal Offices.

Cheshire.—Public shelters at Willaston and Neston; F. Anstead Browne, county architect, The Castle, Chester.

Chesterton.—Houses (8), Cottenham, for R.D.C.; G. G. Bennett, deputy surveyor, County Hall, Hobson Street, Cambridge.

Coventry.—Houses, Scots Lane, Canley and Stoke Aldermoor; D. E. E. Gibson, city architect, 1a, Warwick Row, Coventry.

Cowdenbeath.—Houses, Mungall Street and Moss Side; Burgh Surveyor's Department, Town House, High Street.

Dartford.—Additions, Overy Street; Seagers, Ltd.

Derby.—"Royal Oak" Hotel, Shirland Road, for the Brampton Brewery Co.

Doncaster.—Communal shelters, Marsh Gate area, and surface shelters, Ashfield Road, Furnival Road and Tickhill Road; borough surveyor.

Downham.—Houses (16), Southery; R.D.C. surveyor, Council Offices.

Dunmow.—Fire station and hose drying tower, for R.D.C.; surveyor, Council Offices.

Durham.—Completion of alterations to Flint Hill school; additions to Durham Girls' County and Easington Colliery Council schools; alterations to East Stanley school; and erection of new Billingham Junior Mixed school; F. Willey, county architect, 34, Old Elvet, Durham.

Ealing.—Temporary school, Twyford Abbey Road; C. W. Seddon, borough engineer, Town Hall, W.5.

Ely.—Extensions, Police Buildings; Isle of Ely county architect.

Gillingham.—Fire station, Mill Road; borough engineer.

Glasgow.—Reconstruction of buildings, Germiston Works; Wm. Beardmore & Co., Ltd.

Ironworks additions, Crown Street; Wm. Dixon, Ltd.

Motor works additions, Balmoral Street; Albion Motors, Ltd.

Guildford.—Extensions, Weyside Road factory; Whitehouse Tool & Engineering Co., Ltd.

Haydock.—Telephone exchange, East Lancashire Road, Haydock; W. & P. Knowles, Ltd., contractors, 10, Bradshawgate, Bolton.

Huddersfield.—Factory, Lockwood estate, for William Whiteley & Sons, Ltd., Prospect Iron Works, Lockwood; H. Hoyle, architect, Westgate.

Ipswich.—Emergency hospital; borough architect.

Lancaster.—Large extension to works off Caton Road for Lansil, Ltd., Caton Road; Nicholson & Wright, Ltd., contractors, Cable Street, Lancaster.

Leeds.—Twelve-storey building for Prices Tailors, Ltd., Cardigan Crescent, Kirkstall Road; Wm. Airey & Son (Leeds), Ltd., contractors, Eldon House, Leeds, 2.

Shop and offices on a central site for Marks & Spencer, Ltd., Michael House, 82, Baker Street, London, W.1; Bovis, Ltd., contractors, 1, Stanhope Gate, London, W.1.

Liverpool.—Extension of offices, Gardners Row, for J. Shackerley & Co., Ltd.; H. C. Killender and Medcalf & Medcalf, joint architects, 3, Stanley Street.

Manchester.—Factory, Great Ancoats Street, for G. Corner & Co., Ltd., Allum Street, Ancoats; G. & W. Smith (Builders), Ltd., contractors. Hyde Grove, Longsight, Manchester, 12.

Mansfield.—Three additional ward blocks at Harlow Wood Orthopædic Hospital; Sir J. G. West, architect, Marine Hydro, Rhyl, North Wales.

Market Harborough.—Maternity block extensions (£6,000); Pick, Everard, Keay & Gimson, architects, 6, Millstone Lane, Leicester.

Montgomeryshire.—County school, Llanfair (£17,000); county architect, County Offices, Welshpool.

Motherwell.—Buildings (workshops, shops and offices) for Scottish Co-operative Wholesale Society, 95, Morrison Street, Glasgow (£20,000); architect, S.C.W.S., Glasgow.

Newcastle (Staffs).—A.F.S. stations, Audley, Madeley and Baldwins Gate; R.D.C. surveyor, Public Offices, Newcastle, Staffs.

Newcastle-on-Tyne.—Shelters at St. Mary's Girls' school; G. Carr, builder, Back New Bridge Street, Newcastle.

Oakengates.—Houses in Furnace Lane for U.D.C.; M. S. Lee, surveyor, Council Chambers, Oakengates, Salop.

Over.—Pump-house, for Over Internal Drainage Board; O. Borer, engineer, Elmhurst, Brooklands Avenue, Cambridge.

Owlerton.—Workshops and store, Owlerton Green, for W. R. Swann & Co., Ltd., Penn Works.

Paignton.—Houses (20), Marldon Road; Eastley & Co.

Preston.—Shops and warehouse, Starch House Square, for H. Walters, 18, Guildhall Street.

Ramsey (I.O.M.).—Shops, Market Place; G. Higgins.

Rawtenstall.—Reconstruction at Whitewell Works, Waterfoot; J. H. Hirst, Ltd., slipper manufacturers.

Extensions, Victoria Works; Glendale Yarns, Ltd.

Rowley Regis.—Extensions to premises in Cox's Lane, Old Hill, for Criterion Manufacturing & Supply Co., Ltd., Cox's Lane, Old Hill; W. Blunt & Son, contractors, Queen Street, Old Hill, Rowley Regis.

Sedgley.—Bakehouse, Redhall Road; J. R. Cartwright.

Sheffield.—Extensions to works and offices, Hunter Road, for A. L. Simpkin & Co., Ltd.; W. Marlow & Sons, Ltd., contractors, Holme Lane, Owlerton, Sheffield, 6.

Slough (Bucks).—Erection of 60-bed general hospital, for Slough Hospital Committee; H. H. Clark, architect, 235, Magdalene Road, London, S.W.18.

Southampton.—Salvage plant, including incinerator and steel-framed building (£7,546); S. G. Stanton, borough engineer, Civic Centre.

South Cambridgeshire.—Houses (6), Hall Lane and Heydon Road, Great Chishill, for R.D.C.; H. Hales, clerk, County Hall, Hobson Street, Cambridge.

Southsea.—Public hall, &c., Greetham Street, for St. Luke's Parochial Church Council; secretary.

Stoke-on-Trent.—Warehouse, Gold Street, for J. Beswick, Ltd.; Ducie & Heath, contractors, Granville Place, Longton, Stoke-on-Trent.

Swindon.—Houses (200), Croft Road, for T.C.; borough engineer, Civic Offices.

Tadcaster.—Fire stations at Tadcaster and Micklefield, estimated cost £1,400; J. Worthington, engineer and surveyor, Council Offices, Station Road.

Uttoxeter.—Erection of boiler house at Sunnyside for C. H. Elkes & Sons, Ltd., Dove Valley Bakeries; Ward & Godbehere, contractors, Smithfield Road, Uttoxeter.

Wakefield.—Extensions to Universal Works, Horbury, for Richard Sutcliffe, Ltd.; H. Fallas & Sons, contractors, Twitch Hill, Horbury, near Wakefield.

Wallasey.—Police station, Moreton; borough surveyor, Town Hall.

Walsall.—Further shelters (£26,500); borough engineer.

Warrington.—Air-raid shelters at the new Boteler Grammar School (£1,180); J. Y. Hughes, borough engineer and surveyor, Municipal Buildings.

Wellington.—Houses and shops at Donnington for R.D.C.; surveyor, Council House.

Widnes.—Works extension, West Bank, for W. J. Bush & Co., Ltd.

Works extension, Ditton Road and Nelson Street; Wright & Hamlyn, architects, Patten Chambers, Winmarleigh Street, Warrington.

York.—Hospital; F. Shepherd & Son, contractors, Blue Bridge Lane, York.

Association of Supervising Electrical Engineers

Annual General Meeting

THE number of representatives from the provinces among those present at the annual general meeting of the A.S.E.E., held in London on May 20th, was notably higher than in former years, and this evidence of the national aspect of the A.S.E.E. was commented upon by the chairman of the Association, Mr. J. Johnson Smith, A.M.I.E.E., in his speech at the meeting. He directed attention to recognition of the Association by Government Departments and employers in connection with war conditions and matters affecting the membership; action taken by the Council on behalf of the members in relation to the increased costs of living; the useful purpose the newly formed A.S.E.E. Register was serving in the national interest in co-operation with the Central Register of the Ministry of Labour and National Service; and the strong position in which the Association stood as "liaison officer" in its relationship to industry on behalf of its members.

The annual report of the Executive Council covered a wide range of subjects, including conditions of employment, electricity supply organisation, educational activities, compulsory wiring regulations and registration, A.S.E.E. Guide to the I.E.E. Wiring Regulations, military service, qualifications for membership, etc. The report and statement of accounts which were unanimously adopted, showed a sound financial position. A resolution was passed endorsing the Council's decision with regard to the increased cost of living, and recorded appreciation of employers who had, in this connection, voluntarily granted increases in salaries to meet the added burdens placed upon their staffs.

The apparent inability to use to the fullest extent the knowledge and experience of fully qualified electrical engineers serving with the Forces, was the subject of another resolution, unanimously carried, deploring such wastage which was not in the interests of the nation or of the men themselves who were in danger of losing touch with their work to their detriment on return to civil life.

Voting for election to the Executive Council included for the first time votes recorded at Branch meetings in accordance with the Association's revised rules, and Messrs. S. G. Christian, H. B. Mellor, W. Acton, W. H. Brooks and W. McD. Seymour were elected to the five vacancies. A pleasant conclusion to the proceedings was the presentation by Mr. F. W. Smith, vice-chairman of the A.S.E.E., of a gold medallion to the retiring chairman, Mr. J. J. Smith.